LUT University
Department of Software Engineering
Master's Program in Digital Systems and Service Development

Software Modeling Plan for AudioNow

Group Name: Model Masters

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TEAMWORK METADATA

Participation of each member in project steps:

Sumaiya Antara: Worked on designing the Use Case Diagrams, writing and defining the Use Case Descriptions, defining and describing the Detailed Use Case Descriptions, designing the BCE Diagram and design rationale, designing all the Activity Diagrams and Communication Diagram, writing the descriptions for the Activity Diagrams, participated in preparing the Project Pitches and Conclusions.

Fatima Akhtar: Worked on writing the Introduction, designing and describing Domain Model, designing the Deployment Diagram and describing it, defining the Risk Analysis, making the Project Plan and Schedule, participated in preparing the Project Pitches and Conclusions.

Estimated number of hours used:

Sumaiya Antara:

- **Use Case:** 24 hours
- **BCE Model:** 4 hours
- **Activity and Communication Diagrams:** 10 hours
- **Project Pitch and Conclusion:** 2.5 hours

Fatima Akhtar:

- **Introduction:** 8 hours
- **Domain Model:** 6 hours
- **Deployment Diagram:** 8 hours
- **Risk Analysis:** 8 hours
- **Project Plan and Schedule:** 8 hours
- **Project Pitches and Conclusions:** 2.5 hours

DECLARATION OF AI USE

1) Systems that were used in the development of the contents of this document-
    2) ChatGPT
    3) Blackbox.ai
    4) Gemini

2) How and where they were used (illustrations, proofreading, getting ideas for text)

Used for getting ideas of heading and how it should be done. Below are the prompts that are used-

- What is major difference between activity diagram and swimlane. I want to convert my activity into swimlane as I have multiple actors.
- I am making use cases, deployment diagram, activity and communication diagram, giving the pitch slides. so according to above question what should I do?
- Give me a list of what risks can occur in developing of a project.
- Mention the risks that are related to development of companies like audio now.
- Describe the risks that occur in planning of requirement and designing phase
- Risks that I should keep in mind that can occur in client server application like audio now.
- How detailed use cases can be defined from use case diagram?
- What are the preconditions and postconditions in detailed use cases?

1 INTRODUCTION

The AudioNow project is by MediaFun Inc., a media and influencer company specializing in radio broadcasts and fan material distribution. The objective of this project is to develop a next-generation voice-broadcast social media platform that combines real-time voice chat, podcast subscriptions, and e-commerce functionalities. This integrated service is designed in such a way that users and influencers engage with each other, thus creating a system for interaction, content consumption, and merchandise sales.

The AudioNow project will address the drawbacks of MediaFun's. As Media fun currently use third-party platforms like Spotify and iTunes for broadcasting, we will tailor a system that brings all its services under a unified system. In this this report we will discuss the design, implementation, and planning for the development of AudioNow, describing how to deliver an alpha version of the platform.

Requirements engineering and initial requirements

Requirements engineering is the main step of any project and likewise it forms the backbone of this project. We have designed a clear and systematic approach for gathering, analysing, and documenting the plan of MediaFun Inc. The process has been approached as follows:

1. Requirement Elicitation:

The requirements were obtained from the information provided in the case study of the client. Stakeholders included primary users, and known limitations and features that they expect from a device are identified. The features include being able to have voice chats, subscribe to podcasts, and have a positive experience shopping online.

2. Requirement Analysis:

The requirements were grouped into functional and non-functional aspects, which brings ensuring clarity in the scope of the project. Interactions between users and with the platform, as well as with external systems, were also considered.

3. **Requirement Documentation**:

   High-level use cases like taking subscription, managing advertisements and listening podcasts were designed first to represent user interactions, and these were later described in detail to form the basis of system modelling. This step is carried out to ensure the traceability of the project and alignment with client goals.

4. **Requirement Validation**:

   The requirement is validated by doings the process in a Iterative process that make sure that the documented requirements were consistent with the client's vision, thus lessening the ambiguities and enhancing the possibility of project success.

Goals, solutions and limitations

Our engineering team consist of 2 team members that will do the following work: The first one will understand the requirements by analysing the project's goals, user needs, and functional requirements to create relevant use cases and diagrams. Then Use UML diagrams (deployment, activity, and communication diagrams) to model and visualize the system's structure, behaviour, and interactions. And lastly, we will use pitch slides to present the technical and functional design clearly to stakeholders. We will conduct team reviews to ensure consistency and clarity. And will Iterate based on feedback. Below we have identified some limitations that can be occurred in the project:

Scope Limitations:

1. It means that although the diagrams and use cases will describe the intended behaviour, they will not capture all the possibilities.

Team Capacity:

2. The team is very small, though it can design the first interactions architecture and interactions and moving to other phases.

Requirements

1. Functional Requirements

User Authentication

FR 1: The system shall provide a secure registration process for new users.

FR 2: The system shall allow users to log in using their registered credentials.

FR 3: The system shall support a password recovery feature for users who forget their passwords.

Real-Time Voice Communication

FR 4: Users of the system shall be able to be host of voice chat rooms.

FR 5: The system shall enable people to join existing voice chat rooms.

FR 6: Audio control features of the system shall include options of muting all or selected participants and adjusting volume as well as setting levels of access to sound.

Podcast Features

FR 7: The system shall include a view to enable the users to search for available podcasts.

FR 8: The system shall allow users to select which podcasts they would like to subscribe to.

FR 9: Podcast streaming is another feature that shall be enhanced and allowed right from the platform of the system shall be put into support.

FR 10: The system shall enable users to download podcasts for listening in other instances whenever they are available.

E-Commerce

FR 11: The system shall include the functionality for users to browse merchandise of the fan.

FR 12: Users will be able to use the system to buy merchandise through it.

FR 13: Under the payment solution, the system shall accommodate a variety of modes of payment for transactions.

FR 14: The system shall feature order status tracking tool. This feature will enable the user to track his or her orders.

Advertisement System

FR 15: The system shall also display advertisement for free users for efficient advertisement placement depending on the user's profile.

FR 16: The system shall afford MediaFun administrators' timely tools to administer their ad campaigns efficiently.

Content Management

FR 17: The system shall include functionality that would enable the staff members to add more podcast in the library.

FR 18: The system shall provide the staff with ability to handle promotional matters concerning the podcasts.

FR 19: The system will support management of subscription plans and user data.

Cross-Platform Support

FR 20: The system shall meet compatibility with most used WEB browsers.

FR 21: The implementation of the system shall support mobile platforms, such as smart phones and tablets.

FR 22: The system shall also have a considerable uniformity for the users irrespective of the platform it is being used on.

1.7 Non-Functional Requirements

Non-functional requirements define the qualities and constraints of the system. For AudioNow, these include:

Performance:

FR 23: Diminishing startup time to under 2 seconds to accommodate the 10,000 concurrent users without losing the voice interaction speed and efficiency under 200ms

Scalability:

FR 24: Facilitating horizontal scaling for high user loads.

Security:

FR 25: Protecting login/sign-up/profile/pa information from leakage and making sure that the payments are safe.

Reliability:

FR 26: Ensuring that the servers run for 99.9% of the time and incorporating good mechanisms for handling errors.

Usability:

FR 27: Ensuring that the organization has a flexible or simple layout to accommodate the customer base.

Compliance:

FR 28: Promoting the security of the platforms with regards to GDPR and other regulations related to the privacy of data.

Maintainability:

FR 29: Allowing easy update and debugging through the principle of modularity.

Accessibility:

FR 30: The platform should have access for disabled users and thus should meet the accessibility standards.

Compatibility:

FR 31: The web-based application should work smoothly in different popular web browsers such as chrome, Firefox, safari, edge.

Structure of this report

We have planned the document in such a way that it shows a sequence of steps are followed to give the solution to the client's problem.

- First the requirement team will gather the requirements from the given case study. They will conduct interviews with stakeholders if there is some ambiguity and plan the requirements document. Lastly Finalizing of Requirements document
- Then the design team which is us will design the major requirements. We will make Use cases, Deployment diagram, Activity and communication diagram, and MVC diagrams of each major component. This will be done for architecture approval and UI prototypes.
- Then the development team will develop the main functionality and integration of the system.
- Rigorous testing will be done for stability, usability, and scalability.
- Alpha releases to a pilot audience and collection of meaningful user feedback for improvements.

2 USE CASES

User Interaction Diagram:

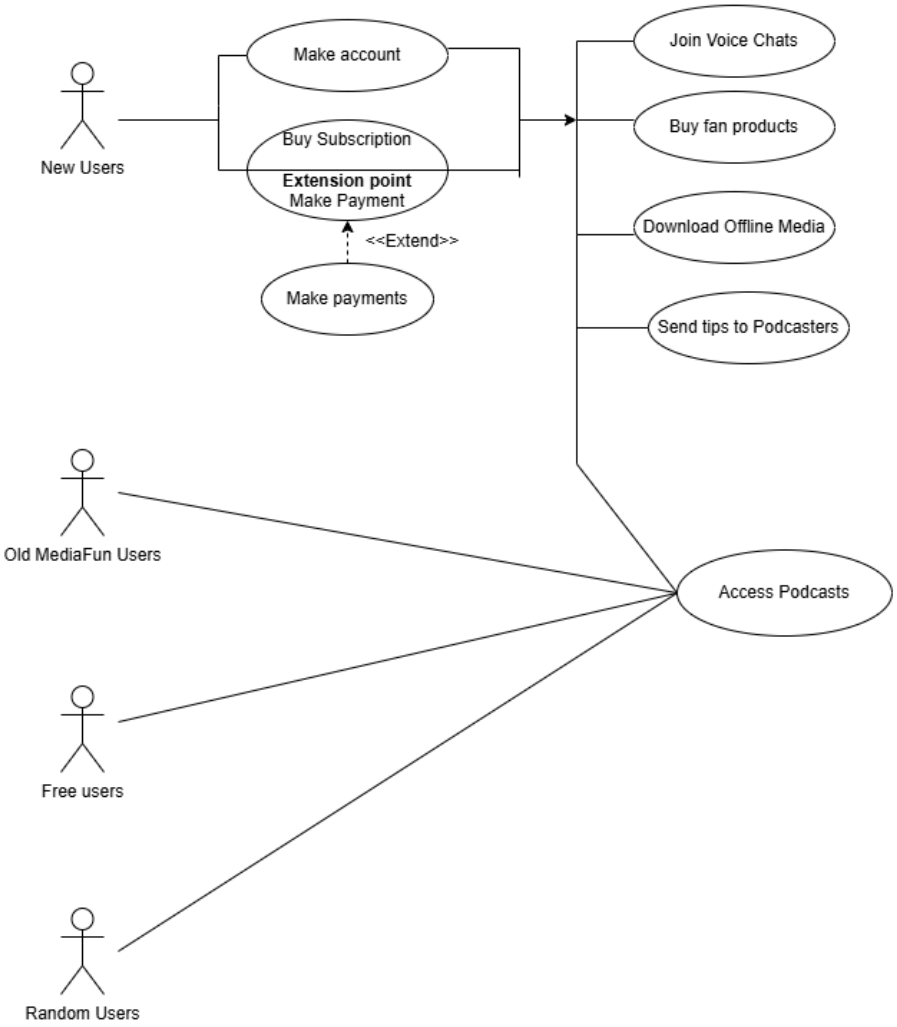

Figure 1: User Interaction Diagram

The following use cases be defined from Figure 1:

Actor 1: New Users
Brief Description: New users interact with the system to create accounts and access initial services.
Use Case 1- Make Account
1. **Brief Description:** New users register to the new system.
2. **General Flow of Events:**
    - User inputs account details.
    - The system validates the input.
    - Account is successfully created.
3. **Preconditions and Requirements:** System registration must be operational.

Use Case 2- Buy Subscription
1. **Brief Description:** Allows new users to subscribe to premium services.
2. **General Flow of Events:**
    - User selects a subscription plan.
    - Payment details are processed.
    - The subscription is activated.
3. **Preconditions and Requirements:**
    - Payment processing system and gateway must be active.
    - Subscription plans must be configured.

Use Case 3- Buy Items
1. **Brief Description:** The subscribed user selects and purchases items from the system.
2. **General Flow of Events:**
    - The customer selects items to buy.
    - The system verifies item availability.
    - The purchase is processed.
3. **Preconditions and Requirements:**
    - The customer must have an account.
    - Items must be available in stock.

Actor 2: Free Users
Brief Description: Free users access limited features without a subscription.
Use Case 1- Access Podcasts
1. **Brief Description:** Free users can stream publicly available podcasts.
2. **General Flow of Events:**
    - User searches for free podcasts.
    - Selected podcast streams on the platform.
3. **Preconditions and Requirements:** Podcasts must be tagged as "free".

Actor 3: Random Users
Brief Description: Random users interact casually without creating accounts.
Use Case 1- Access Podcasts
1. **Brief Description:** Random users can listen to free podcasts without logging in.

2. **General Flow of Events:**
    - The user browses free content.
    - The system streams podcasts.
3. **Preconditions and Requirements:** No authentication required for free podcasts.

Content Management Diagram:

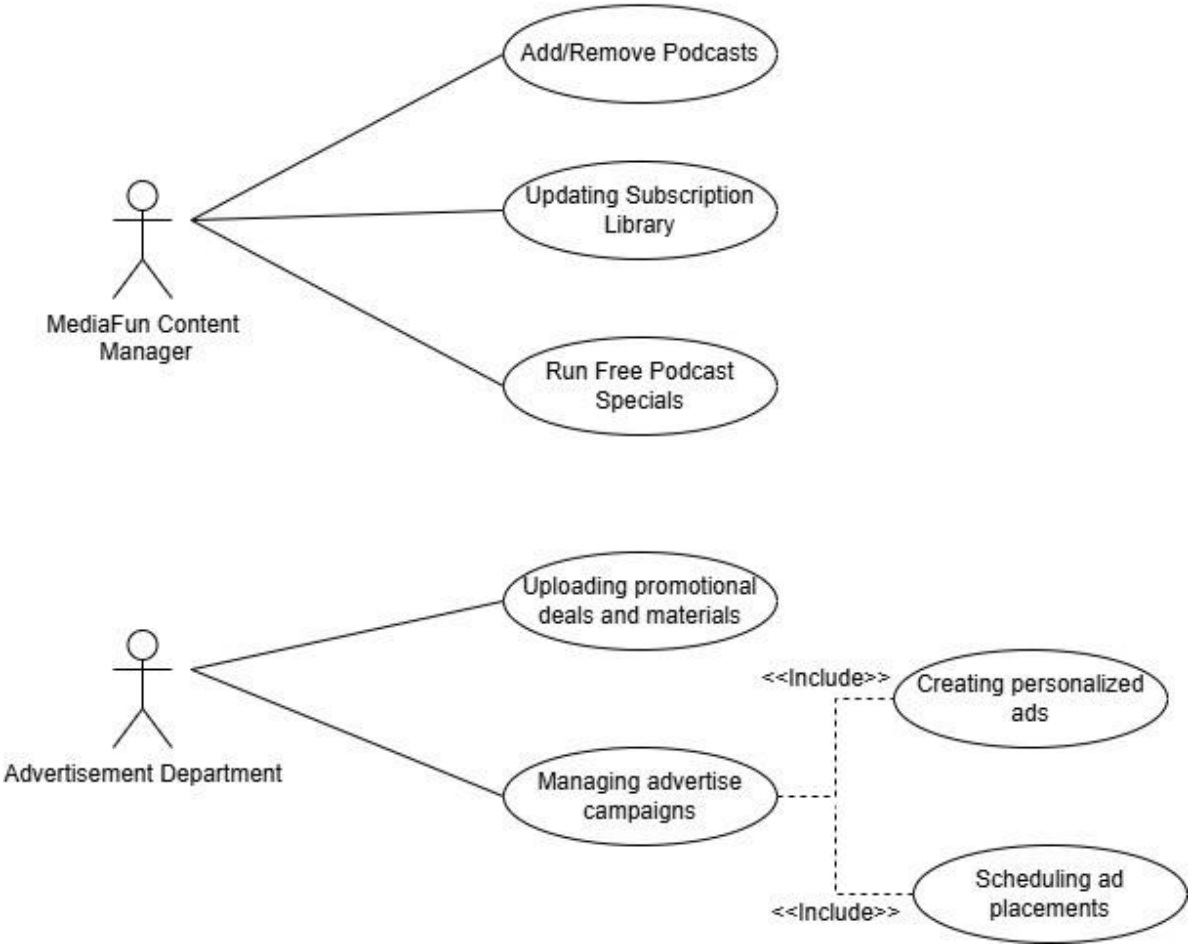

Figure 2: Content Management Diagram

The following use cases are defined from Figure 2:

Actor 4: MediaFun Content Manager
Brief Description: Responsible for managing podcasts and maintaining the subscription library.
Use Case 1- Add/Remove Podcasts

1. **Brief Description:** Manages the podcast content by adding or removing episodes.
2. **General Flow of Events:**
   - The manager selects the podcast database.
   - Content is uploaded or deleted as required.
   - Changes are saved and made available to users.
3. **Preconditions and Requirements:**
   - The content manager must be logged in.
   - Appropriate content rights must be validated.

Use Case 2- Updating Subscription Library

1. **Brief Description:** Maintains the subscription content available to users.
2. **General Flow of Events:**
   - The manager accesses the library.
   - Updates or reorganizes content.
   - Saves and synchronizes changes for the system.
3. **Preconditions and Requirements:**
   - The library must be functional.
   - User subscription data must be integrated.

Actor 5: Advertisement Department
Brief Description: Oversees promotional activities, ad placements, and manages advertising campaigns.
Use Case 1- Managing advertising campaigns

1. **Brief Description:** Plans and executes advertising campaigns.
2. **General Flow of Events:**
   - The department creates a new campaign.
   - Materials are uploaded and scheduled.
   - Campaign performance is monitored.
3. **Preconditions and Requirements:**
   - Access to advertising tools.
   - Campaign objectives and materials ready.

Use Case 2- Uploading promotional deals and materials

1. **Brief Description:** Uploads the contents of promotional deals and materials
2. **General Flow of Events:**
   - Select promotional files.
   - Enter target audience specifications.
   - Launch promotional content to the system.

3. **Preconditions and Requirements:** Promotional materials must comply with system standards.

Old Customers Use Case Diagram:

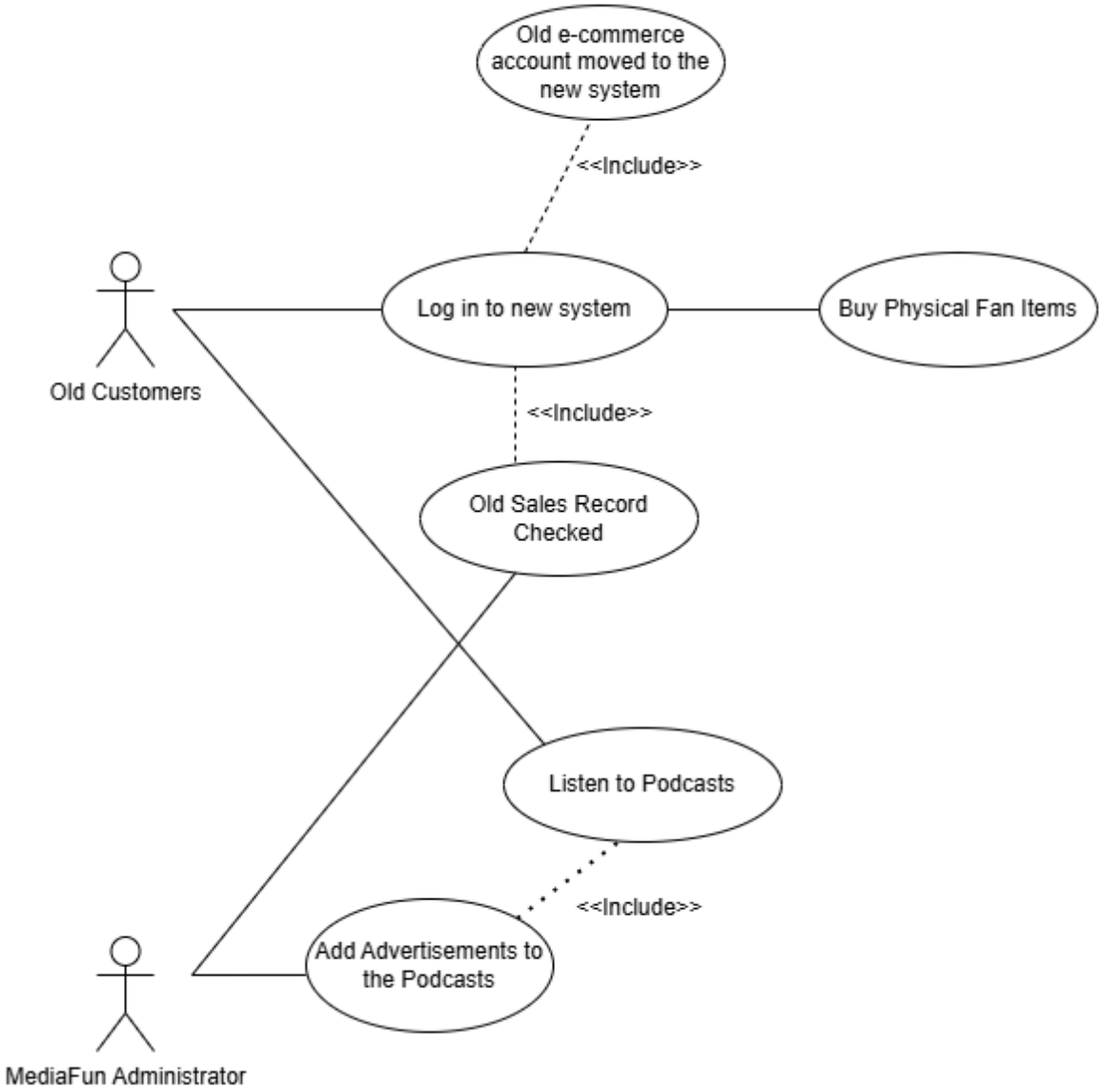

Figure 3: Old Customers Use Case Diagram

Order and Payment Use Case Diagram:

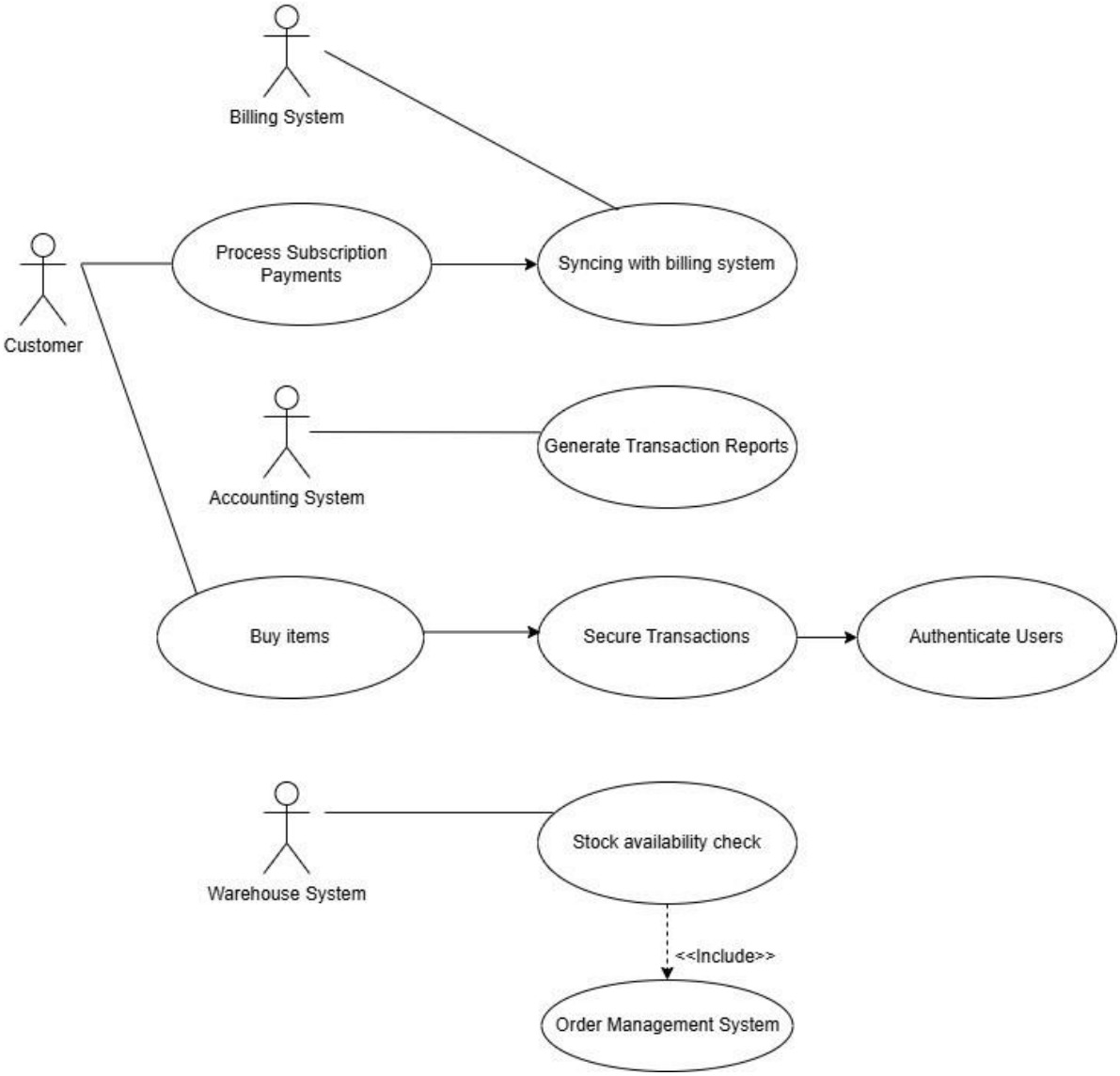

Figure 4: Order and Payment Use Case Diagram

The following use cases have been shown on Figure 1, Figure 3 and Figure 4:

Actor 6: Old Customers

Brief Description: Old customers were part of the previous e-commerce system and need to be transferred to the new system to access their accounts, purchase items and enjoy podcasts.

Use Case 1- Log in to the new system

1. **Brief Description:** Old customers log into the new system to access their previous accounts and related services.

2. **General Flow of Events:**
   - The old customer navigates to the login page of the new system.
   - They enter their credentials.
   - The system verifies the details and logs them in.
   - Account data from the old system is displayed.
3. **Preconditions and Requirements:**
   - Old account information must be migrated to the new system.
   - The login service must be operational.

Use Case 2- Purchase physical fan items

1. **Brief Description:** Old customers purchase fan products using the new system.
2. **General Flow of Events:**
   - The customer browses available products.
   - Selected items are added to the cart.
   - The system processes the purchase and confirms the order.

3. **Preconditions and Requirements:**
   - Products must be listed in the system.
   - Payment and inventory system must be functional.

Use Case 3- Listen to podcasts

1. **Brief Description:** Old customers stream or download podcasts after logging into the new system.
2. **General Flow of Events:**
   - The customer searches or selects a podcast.
   - The system plays the podcast
3. **Preconditions and Requirements:**
   - The podcast must be available in the system
   - The media player must be functional.

Actor 7: MediaFun Administrator

Brief Description: Responsible for managing the system and ensuring that old customer data is migrated and operational, along with handling advertisements.

Use Case 1- Moving old e-commerce account to the new system

1. **Brief Description:** The administrator oversees migrating old customer accounts into the new system.
2. **General Flow of Events:**
   - Old account data is extracted from the legacy system.

- Data is validated and converted into the new format.
- Accounts are imported into the new system and verified for correctness.

3. **Preconditions and Requirements:**
   - Access to the old system's database is required.
   - The new system must support data migration.

Use Case 2- Add Advertisements to the Podcasts

1. **Brief Description:** Administrators include advertisements into podcasts for monetization.
2. **General Flow of Events:**
   - The administrator selects podcast episodes.
   - Advertisements are uploaded or selected from a library.
   - The system integrates ads into the selected podcasts.
3. **Preconditions and Requirements:**
   - Advertisements must comply with platform guidelines.
   - Tools for embedding ads must be available.

Detailed Use Cases:

Use Case 1: Taking new subscription of the system

1. Brief Description:

This use case describes how new customers subscribe to the MediaFun system, enabling them to access podcasts, purchase fan items, and enjoy other premium services.

Flow of Events:

2.1 Basic Flow of Events:
2.1.1 Customer visits the subscription page:
The system displays a subscription page with different plans and benefits.
2.1.2 Customer selects a subscription plan:
The user browses available monthly or yearly subscription options and selects one.
2.1.3 Customer provides personal information:
The system prompts the user to enter required details such as name, email and payment information.
2.1.4 Customer agrees to terms and conditions:
The user reads and accepts the terms and conditions by checking a box.
2.1.5 System processes payment:
The system validates the payment details and deducts the subscription fee from the user’s chosen payment method.
2.1.6 Subscription is activated:
Upon successful payment, the system activates the subscription, sends a confirmation email and grants access to premium features.

1.2 Alternative Flow of Events:

2.2.1 Payment failure:
If the payment fails due to insufficient funds or incorrect payment details, the system displays an error message and prompts the customer to retry with a different payment method.
2.2.2 Existing customer with duplicate email:
If the email address is already associated with an account, the system notifies the user and suggests logging into the existing account.

2. Special Requirements:

3.1 Secure Payment Handling:
The payment process must comply with PCI DSS standards to ensure secure handling of customer payment details.
3.2 Subscription Management:
The system must allow customers to upgrade, downgrade or cancel their subscriptions at any time.
3.3 Multi-Device Access:
Subscriptions must allow customers to access their account across multiple devices.

3. Preconditions:

4.1 Active Subscription System:
The subscription system must be online and operational.
4.2 Available Plans:
Subscription plans and pricing must be pre-configured in the system.

4. Postconditions:

5.1 Subscription Activation:
The customer’s subscription is successfully created, and they gain access to premium features.
5.2 Confirmation Email:
The system sends a confirmation email with the subscription details and customer support contact information.
5.3 Payment Logging:
The system records the payment transaction and links it to the customer’s account.

Use Case 2: Managing Advertisement Campaigns

1. Brief Description: This use case describes how the Advertisement Department manages advertising campaigns within the MediaFun system. This includes creating, updating, and monitoring campaigns, as well as scheduling ad placements and personalizing ads for better engagement.

2. Flow of Events:

2.1 Basic Flow of Events:
2.1.1 Login to the system:
The Advertisement Department user logs into the system with their credentials.
2.1.2 Access advertisement management module:
The user navigates to the advertisement management section of the system.
2.1.3 Create a new campaign:
The user selects the "Create New Campaign" option and inputs details such as campaign name, target audience, duration, and budget.
2.1.4 Upload promotional content:
The user uploads images, videos, and other materials required for the campaign.
2.1.5 Schedule ad placements:
The user schedules when and where the advertisements will appear, including podcasts, banners, or media pages.
2.1.6 Personalize ads:
The system uses the target audience data to tailor the ad content based on user demographics, preferences, and behaviour.
2.1.7 Launch the campaign:
The system confirms campaign settings and activates the campaign, making ads visible to users.
2.1.8 Monitor campaign performance:
The user monitors the campaign using analytics provided by the system, including impressions, clicks, and conversions.

2.2 Alternative Flow of Events:
2.2.1 Campaign content rejected:
If the uploaded promotional content does not meet the platform's guidelines, the system notifies the user, specifying the reasons for rejection.
2.2.2 Budget constraints:
If the budget set for the campaign exceeds the limit allowed by the system or department policy, the system displays a warning and requests revision.
2.2.3 Editing active campaigns:
If the user wants to modify an active campaign, they access the campaign details, make the required changes, and confirm updates.

3. Special Requirements:
3.1 Compliance with Advertising Standards:
The system must enforce advertising guidelines to ensure all content complies with local laws and platform policies.

3.2 Analytics Dashboard:
The system must provide an intuitive dashboard for real-time monitoring of campaign performance metrics.
3.3 Personalization Engine:
The system must use AI/ML algorithms to effectively personalize ads based on user data.

4. Preconditions:
4.1 User Authentication:
The Advertisement Department user must have valid login credentials and appropriate access permissions.
4.2 Campaign Content Availability:
All promotional materials must be ready for upload and compliant with platform policies.
4.3 Advertising Budget:
A pre-approved budget must be allocated for the campaign.

5. Postconditions:
5.1 Campaign Activation:
The campaign is successfully launched, and ads are visible to the target audience.
5.2 Performance Tracking:
The system begins tracking the campaign's performance and generates reports.

5.3 Ad Revenue Logging:
The system logs revenue generated from the campaign for accounting and auditing purposes.

Use Case 3: Listen to Podcasts

1. Brief Description:

Old customers stream or download podcasts after logging into the new system.

2. Flow of Events:
2.1 Basic Flow of Events
2.1.1 Customer logs into the system and navigates to the podcast library.
2.1.2 Customer selects a podcast episode.
2.1.3 The system streams the podcast or offers a download option based on customer choice.
2.1.4 The system records listening statistics, such as duration listened.

2.2 Alternative Flow of Events:
2.2.1 If the selected podcast is unavailable, the system displays an error message and suggests similar podcasts.

3. Special Requirements:
3.1 High-Quality Audio Streaming:
The system must ensure high-quality audio streaming without buffering for users with stable internet connections.

4. Preconditions:
4.1 Podcasts Available:
The podcast library must be populated with available episodes.

5. Postconditions:
5.1 Recorded Statistics:
Customer's interaction with the podcast is recorded for analytics purposes.

Use Case 4: Add Advertisements to the Podcasts

1. Brief Description:

MediaFun administrators embed advertisements into podcast episodes to monetize the platform.

2. Flow of Events:

2.1 Basic Flow of Events:
2.1.1 Administrator logs into the system and navigates to the advertisement module.
2.1.2 Administrator selects a podcast episode for advertisement integration.
2.1.3 Administrator uploads an advertisement file or selects an existing one from the library.
2.1.4 The system integrates the advertisement at specified timestamps in the podcast.
2.1.5 Administrator reviews and approves the final podcast with the integrated advertisement.

2.2 Alternative Flow of Events:
2.2.1 If the uploaded advertisement does not meet system requirements (e.g., file size, format), the system displays an error message.
2.2.2 Administrator uploads a compliant advertisement file.

3. Special Requirements:
3.1 Compliance with Guidelines:
Advertisements must meet the platform’s size, format, and content guidelines.

4. Preconditions:
4.1 Available Podcast Episodes:
The selected podcast episode must exist in the system’s library.

5. Postconditions:
5.1 Advertisement Integration
The advertisement is successfully integrated into the podcast episode and available for customer playback.

3 DOMAIN MODEL

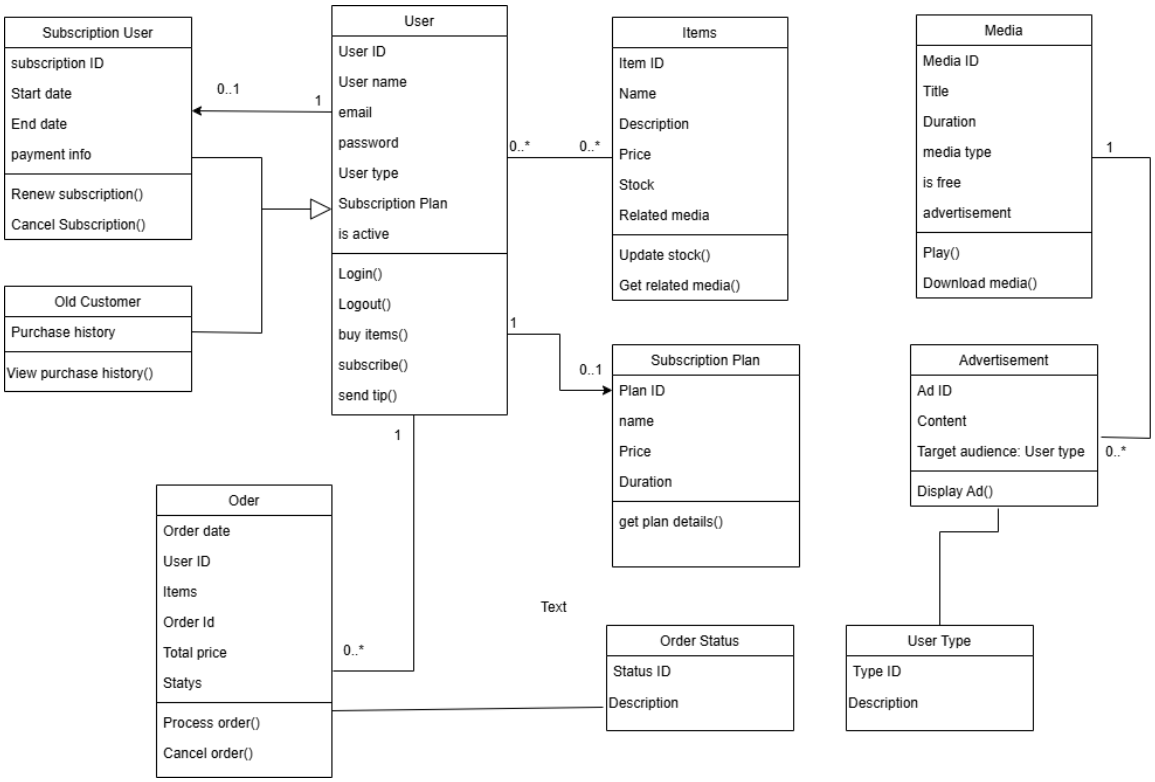

Figure 5: Domain Model Diagram

Essential Concepts as Classes

1. **User**
    - Represents individuals using the system.
    - Relationships:
        - Generalization to **Subscription User** and **Old Customer** to represent specific types of users.
2. **Subscription User**
    - A specialized user who subscribes to a plan.
    - Relationship:
        - Association with **Subscription Plan** (a user can have one active plan).
3. **Old Customer**
    - Represents a legacy user who may not have an active subscription.
    - Generalization relationship with **User**.

4. **Subscription Plan**
    - Represents subscription tiers or plans.
    - Relationships:
        - Associated with **Subscription User**.
        - Linked to **Advertisement** for marketing purposes.
5. **Order**
    - Represents a purchase made by a user.
    - Relationships:
        - Associated with **Items** (an order may contain multiple items).
        - Linked to **Order Status** for tracking the state of the order.
6. **Items**
    - Represents individual media items or products purchased or accessed.
    - Relationship:
        - Linked to **Order** and **Media** for metadata.
7. **Media**
    - Represents the content catalog.
    - Relationships:
        - Associated with **Advertisement** for promotional purposes.
8. **Advertisement**
    - Represents promotional content shown to users.
    - Relationships:
        - Linked to **Subscription Plan** and **Media** for targeted promotions.
9. **Order Status**
    - Tracks the progress of an order.
    - Relationships:
        - Linked to **Order**.
10. **User Type**
    - Categorizes users into types (e.g., regular, premium).
    - Relationships:
        - Linked to **User** for classification.

- **Key Relationships**
- **Inheritance (Generalization):**

    - **User → Subscription User**, **Old Customer**: The system differentiates between generic users and specific types based on their engagement.
- **Associations:**
    - **Subscription User ↔ Subscription Plan**: Defines the link between a user and the plan they are subscribed to.
    - **Order ↔ Items**: Orders include one or more items.
    - **Order ↔ Order Status**: To track the lifecycle of the order.
    - **Media ↔ Advertisement**: Ads are tied to specific media content.

4 INFRASTRUCTURES

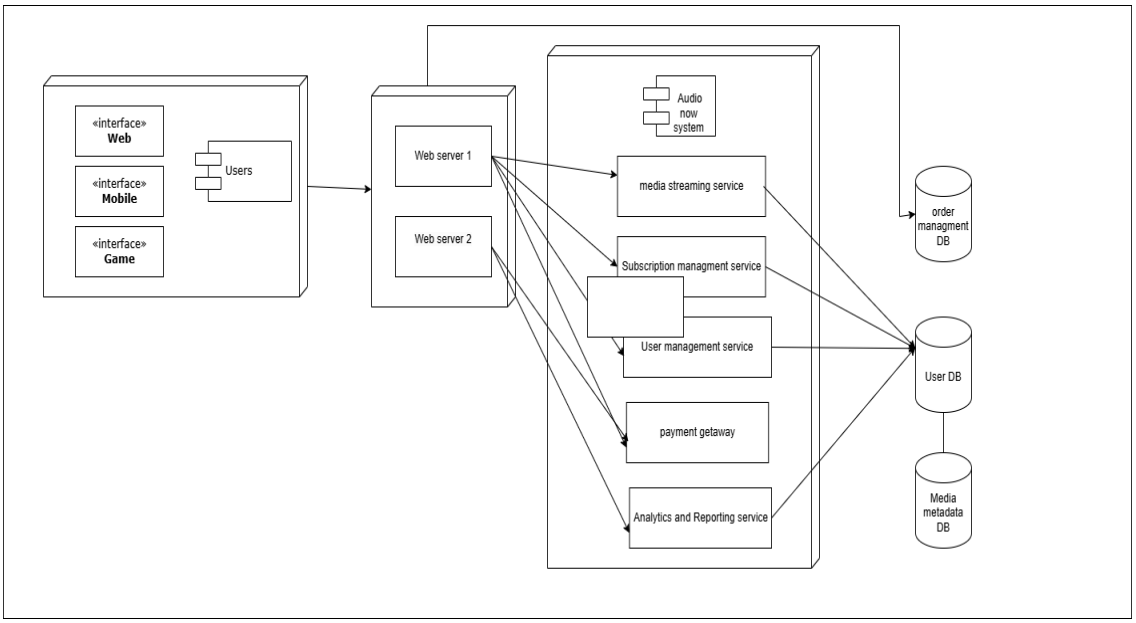

Figure 6: Deployment Diagram

Logical View (Functional Structure)

The logical view focuses on the functionality of the system, showing components and services:

1. **User Interfaces**:
    - **Web Interface**: For desktop/laptop users accessing via browsers.
    - **Mobile Interface**: For app-based access on smartphones.
    - **Game Interface**: Specialized for gamers, integrating with consoles.
2. **Core Services**:
    - **Media Streaming Service**: Handles content delivery to users.
    - **Subscription Management Service**: Manages user subscriptions, billing plans, and access rights.
    - **User Management Service**: Manages user authentication, profiles, and permissions.
    - **Analytics and Reporting Service**: Collects user data and provides insights to administrators.
    - **Payment Gateway Integration**: Handles payments via third-party providers like Stripe or PayPal.

3. **Databases**:
    - **User DB**: Stores user account and profile data.
    - **Order Management DB**: Stores purchase history, transactions, and order details.
    - **Media Metadata DB**: Stores information about the media content, such as titles, formats, and metadata.

Deployment View (Hardware Structure)

This focuses on the physical layout, including servers, networks, and connections:

1. **Web Servers**:
    - **Web Server 1** and **Web Server 2**: Handle user requests and route them to the appropriate backend services.
    - Hosted on cloud infrastructure or physical servers.
2. **Application Servers**:
    - Hosts backend services like Media Streaming, Subscription Management, etc.
    - It can run in a clustered environment or separate Virtual Machines (VMs) for scalability.
3. **Databases**:
    - **User DB**, **Order Management DB**, and **Media Metadata DB**: Typically deployed on dedicated database servers for reliability and performance.
4. **Payment Gateway**:
    - Connects to external third-party services securely via APIs for payment processing.
5. **Network**:
    - Communication between components is facilitated through a secure internal network (e.g., VPN, load balancers).

5 BCE SYSTEM MODEL

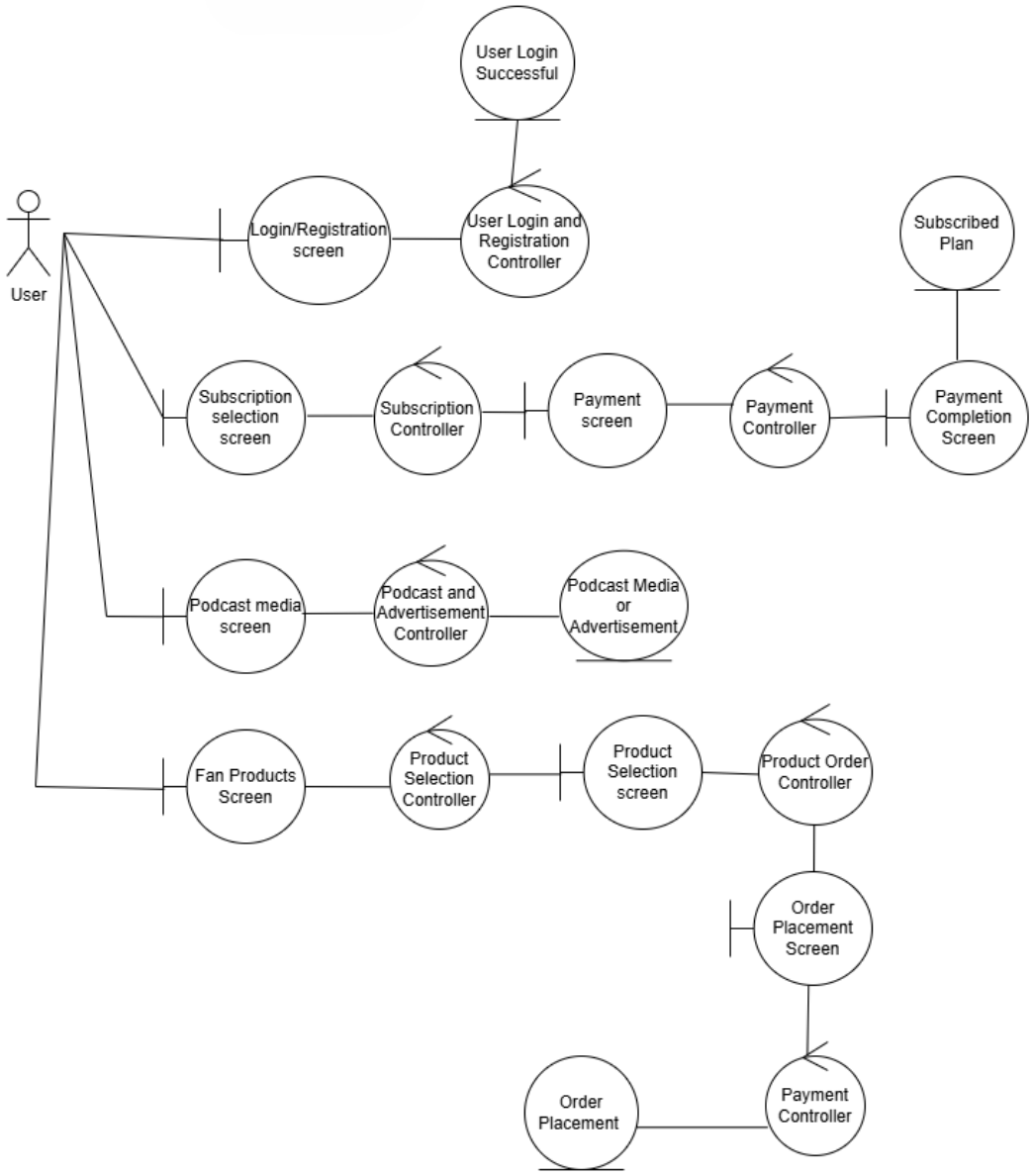

Figure 7: BCE Diagram

The BCE (Boundary, Control, Entity) diagram outlines the interaction between the user and system components for various functionalities, including login, subscriptions, podcast access and product purchases. Boundary components like the Login/Registration Screen and Subscription Selection Screen provide user interfaces, while Control components such as the Subscription Controller and Payment Controller handle the system's logic and workflows.

Entity components like Subscribed Plan and Product Order represent the underlying data or states. This structure ensures clear separation of responsibilities, promoting modularity and flexibility for system maintenance and scalability.

6 ACTIVITY AND COMMUNICATIONS DIAGRAM

Content Management Activity Diagram

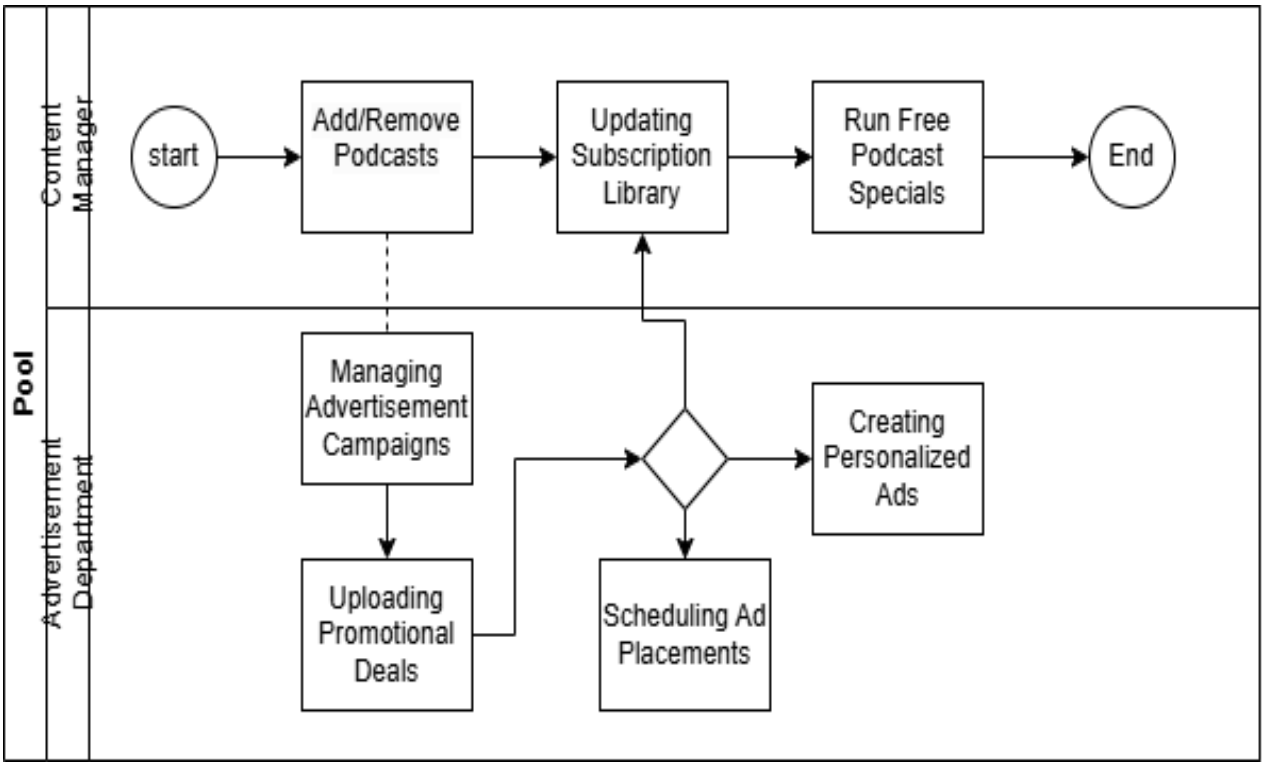

Figure 8: Content Management Activity Diagram

Explanation of the Activity Diagram

The **Content Management Activity Diagram** represents the flow of tasks and interactions between the **MediaFun Content Manager** and the **Advertisement Department** as follows:

1. **MediaFun Content Manager Activities**:
    - **Add/Remove Podcasts**: This task starts the workflow for managing podcasts in the subscription library.
    - **Updating Subscription Library**: Represents updating the list of available podcasts after adding or removing podcasts.
    - **Run Free Podcast Specials**: Involves launching promotions or free podcasts to attract new subscribers.
2. **Advertising Department Activities**:
    - **Uploading Promotional Deals and Materials**: Includes creating promotional content for advertising campaigns.

- **Managing Advertise Campaigns**: Handles campaign-related operations such as content approval and scheduling.
- **Creating Personalized Ads (Include)**: This subtask is part of the campaign management process, where personalized content is designed.
- **Scheduling Ad Placements (Include)**: Another subtask that involves timing and placement of ads for maximum effectiveness.

Subscription Process Activity Diagram

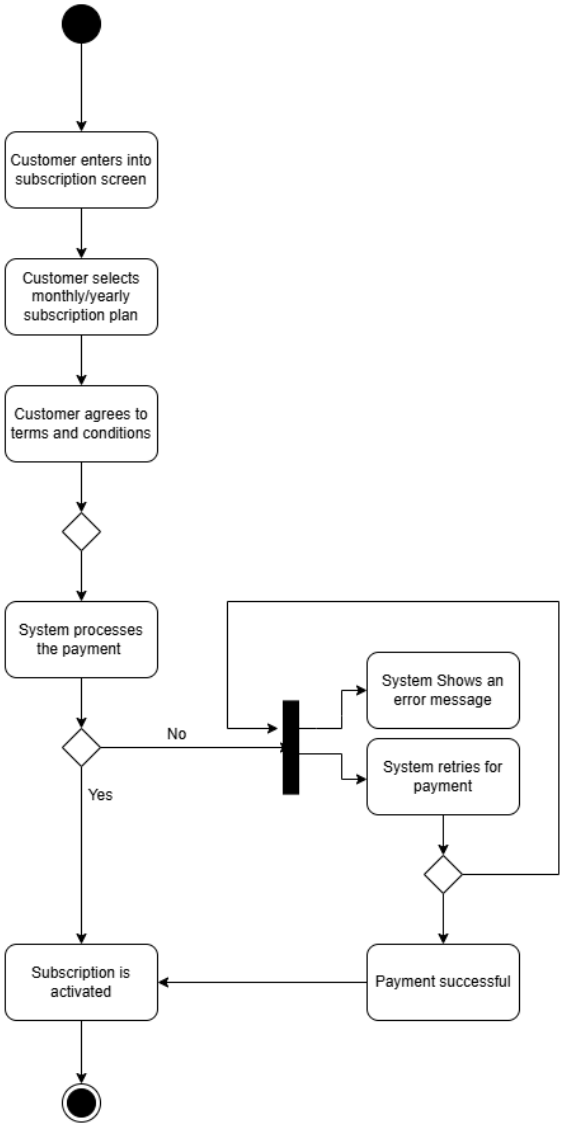

Figure 9: Subscription Process Activity Diagram

This activity diagram outlines the process of a customer subscribing to a plan in the system. It includes the following steps:

1. **Start**:
    - The process begins when the customer enters the subscription screen.
2. **Customer Selects Plan**:
    - The customer selects either a monthly or yearly subscription plan based on their preference.
3. **Customer Agrees to Terms**:
    - The customer agrees to the terms and conditions of the subscription plan before proceeding further.
4. **System Processes Payment**:
    - The system processes the payment using the provided payment details.
5. **Decision: Payment Successful or not**:
    - If the payment is successful:
        - The subscription is activated, and the process ends.
    - If the payment fails:
        - The system displays an error message to the customer.
        - The system retries the payment process.
6. **Retry Mechanism**:
    - The retry mechanism ensures that the customer has another chance to process the payment.
    - If the retry is successful, the payment is marked as successful, and the subscription is activated.
    - If the retry fails, the process can repeat or terminate based on system rules.
7. **Subscription Activation**:
    - Once the payment is successful, the system activates the subscription for the customer.

8. **End**:

- The process concludes after the subscription is successfully activated.

Advertisement Management Activity Diagram:

Figure 10: Advertisement Management Activity Diagram

This activity diagram illustrates the workflow for managing and launching an advertising campaign. The detailed explanation is below:

1. **Start**:
    - The process begins when the Advertisement Department logs into the system.
2. **Access Advertisement Management Section**:
    - After logging in, the user navigates to the advertisement management section.
3. **Create New Campaign**:
    - The user selects the option to create a new advertising campaign.
4. **Input Campaign Details**:
    - The user provides the necessary details for the campaign, including:
        - Campaign name
        - Target audience
        - Budget
        - Campaign duration.
5. **Budget Validation**:
    - The system checks if the budget exceeds the set limits:
        - If the budget exceeds the limit, the system prompts the user to reset the budget and retry.
        - If the budget is within limits, the process moves forward.
6. **Upload Media Content**:
    - The user uploads the media content associated with the campaign.
7. **Content Validation**:
    - The system checks if the uploaded content complies with platform guidelines:
        - If the content violates guidelines, the system notifies the user of the rejection.
        - If the content meets the guidelines, the process continues.
8. **Define Advertisement Details**:
    - The system allows the user to:
        - Schedule the advertisements.
        - Define the location of the ads within the podcasts.
9. **Tailor Advertisement Content**:
    - The user fine-tunes the ad content to match campaign requirements.
10. **Campaign Activation**:
    - Once all the details are finalized, the campaign is activated.
11. **Monitor Campaign Performance**:
    - After activation, the system enables the user to monitor the campaign's performance metrics.
12. **End**:

- The workflow concludes with the monitoring phase.

Podcast Interaction System Activity Diagram

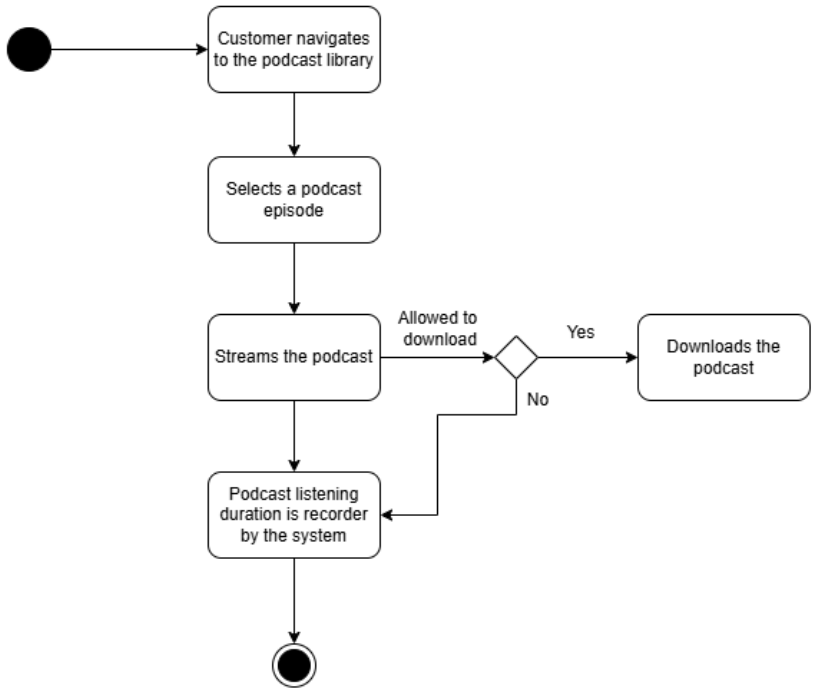

Figure 11: Podcast Interaction System Activity Diagram

This activity diagram represents the flow of actions involved in accessing and interacting with a podcast library system. Here's the description:

1. **Start Point**: The process begins when the customer navigates to the podcast library.
2. **Selecting a Podcast Episode**: The customer browses through the podcast library and selects a specific episode to listen to.
3. **Streaming the Podcast**: The selected podcast episode starts streaming for the customer.
4. **Download Check**: A decision point determines whether the customer is allowed to download the podcast.
    - **Yes**: If allowed, the customer downloads the podcast.
    - **No**: The process skips the download option.

5. **Recording Listening Duration**: Regardless of whether the customer streams or downloads, the system records the duration of the podcast listened to by the customer.
6. **End Point**: The process concludes after the system records the podcast listening duration.

The communications behind the activities are shown in the below communications diagram:

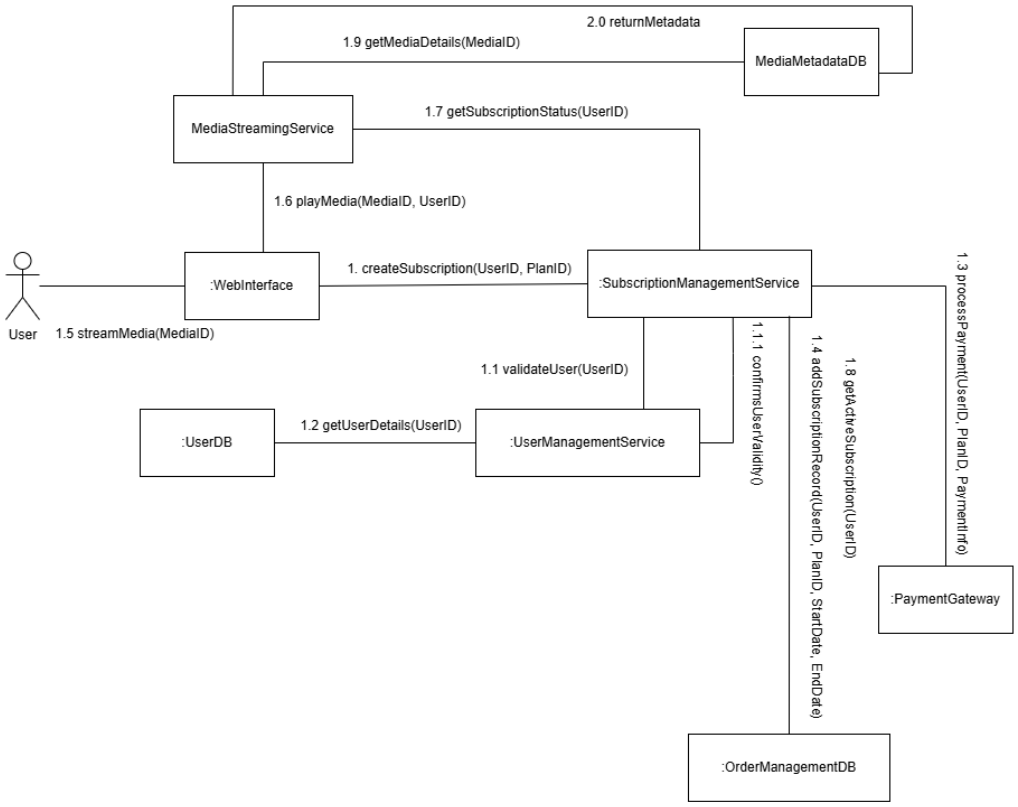

Figure 12: Communications Diagram

7 RISK ANALYSIS

Risk Description	Risk Level (Low, Medium, High)	Acceptability
Service downtime due to failure of Server cluster	High	Unacceptable
Advertisement system down	Medium	Conditionally Acceptable
Failure of Payment gateway	High	Unacceptable
Corruption of DB or failure	High	Unacceptable
Content Delivery Network (CDN) latency issues	Medium	Conditionally Acceptable

Selected Risk: Failure of Server cluster

Fault Tree Analysis (FTA)

Top Event: Service downtime due to failure of Server cluster

Fault-Tree Structure:

1. **Primary Fault**: **Load Balancer Failure**
    - **Contributing Faults**:
        - Ineffective load balancing algorithms
        - Overload as a result of rush hour traffic♣
2. **Primary Fault**: **Web Server Failure**
    - **Contributing Faults**:
        - Hardware malfunction
        - Limited amount of computation power
        - Operating system crash
3. **Primary Fault**: **Database Server Failure**
    - **Contributing Faults**:
        - Disk failure
        - There is inadequate replication as well as backing up failure
        - Memory exhaustion

        - Lack of replication and backups
4. **Primary Fault**: **Network Connectivity Issues**
    - **Contributing Faults**:
        - ISP failure
        - DDoS attack

8 PROJECT PLAN AND SCHEDULE

Project Plan and Draft Schedule for AudioNow System

1. Process Model

Chosen Model: Agile Scrum Model

Rationale:

Iterative Development: Agile enables us to release in small steps to capture feedback from the stakeholders and test users.

Flexibility: Versions may be introduced easily because of the flexibility that is important when it comes to a complicated project such as the AudioNow which relies on users' participation.

Transparency: Daily sprints give exposure to the flow of the project.

Collaboration: Encourages cooperation between developers and testers, as well as with other stakeholders and aligns them with business needs.

2. Development Deadlines and Milestones

Overall Timeline: 6 Months to Alpha Stage

Sprint Length: 2 Weeks

Phase	**Milestone**	**Duration**	**Deadline**
Planning	Requirements Gathering & Analysis	2 weeks	Month 1 , Week 4
Design	System Architecture & UI/UX Design	3 weeks	Month 2, Week 8

Development Sprint 1	Core Features (Social Rooms, Podcasts)	4 weeks	Month 3, Week 12
Development Sprint 2	E-commerce Integration	3 weeks	Month 4, Week 16
Development Sprint 3	Advertising & Analytics Systems	4 weeks	Month 5, Week 20
Testing Phase	Functional Testing	3 weeks	Month 6, Week 24
Pilot Release	Alpha Testing with Limited Users	3 weeks	Month 7, Week 28

3. Needed Tools and Resources

Human Resources:

- **Project Manager (1):** Oversee timelines and stakeholder communication.
- **Developers (4-5):** Backend, frontend, and mobile app specialists.
- **UI/UX Designer (1):** Design intuitive and visually appealing interfaces.
- **QA Engineer (2):** Ensure functionality and usability through rigorous testing.
- **DevOps Engineer (1):** Handle server setup, scalability, and CI/CD pipelines.

Software Tools:

- **Development Tools:** Visual Studio Code, IntelliJ IDEA
- **Collaboration Tools:** Jira (task tracking), Confluence (documentation), Slack
- **Version Control:** Git with GitHub/GitLab
- **Design Tools:** Figma for UI/UX
- **Testing Tools:** Selenium, JUnit, Postman
- **Analytics:** Google Analytics, custom data collection scripts

Hardware:

- **Development Machines:** High-performance PCs for developers
- **Server Cluster:** AWS, Azure, or GCP for deployment and scalability
- **Test Devices:** Mobile phones, tablets, consoles, and PCs for compatibility testing

4. Testing and Piloting Plan

Goal: Make certain that the system is operative, expandable and easy to use before launching it first at a large scale.

1. **Internal Testing:**

- Carry out integration tests for single parts of the software (backend, frontend, database).
- Effort to do integration testing of the application workflows (e.g. user sign up, streaming of podcasts, purchasing).
- Perform load testing to prove efficiency in the situation where traffic and user numbers are high.
- Ensure the system is functional, scalable, and user-friendly before full-scale launch.

2. **Alpha Testing (Pilot):**
    - **Participants:** Sample 100 – 200 users from the current MediaFun's customers of all the user types.
    - **Duration:** 3 weeks.
    - **Tasks for Participants:**
        - Listening to podcasts, participating in audio chats, shopping and giving feedback.
        - Submit any bugs found, the problems faced while using the application and ideas for features.
3. **Monitoring:**
        - Analyse the level of people's active participation, possible areas of disconnect and the performance of servers.
        - Follow problems through the bug reporting systems such as Bugzilla or GitHub Issues.able, and user-friendly before full-scale launch.

Information to Collect:

- **User Experience Feedback:** UI/UX, Usability, interface design, and layout, and user satisfaction scores.
- **Performance Metrics:**
    - Response time to the product or services requirements and needs of the customers
    - Rates of success of transactions and interactions.
- **Error Reports:** Log crashes, bugs, and incomplete transactions.
- **Engagement Data:** Most used features and content, retention rates for testers.

5. Schedule Draft

Timeline Overview:

- **Months 1–2:** Gathering and Planning of requirements. Finalizing of Requirements document
- **Months 3–4:** Making designs of requirement. design phase, with milestones for architecture approval and UI prototypes.
- **Months 5–:** Development of the main functionality and integration.
- **Month 6:** Rigorous testing for stability, usability, and scalability.
- **Month 7:** Alpha releases to a pilot audience and collection of meaningful user feedback for improvements.

9 PROJECT PITCH AND CONCLUSIONS

Project pitches have been included in Appendix 2.

Conclusions: The Audio Now project has offered a transmutative approach for Media Fun company to claim control over their media distribution by enhancing the user engagement and boosting the company's revenue. By incorporating real-time voice chats, subscription of podcasts, and e-commerce functions into a single platform, the system has addressed the critical issues of dependency of third-party services and limited direct user interaction. The new system has scalability, secure data management, and cross-platform compatibility, which ensures that the user is satisfied and provides operational efficiency. Moreover, the emphasis on accessibility, tailored user experiences, has reemerged Audio Now in the influencer-driven media landscape. Some issues such as GDPR compliance, scalability problems to accommodate the high traffic, and integration with e-commerce possibilities still exist, however, it is an advantage that by using agile development methodology, the platform can be easily adapted and improved step by step, depending on user feedback. This places Audio Now in a strategic, innovative space well positioned for the redefinition of influence and audience interaction and commerce.

10 REFERENCES

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2. Sommerville, I., Integrated Requirements Engineering: A Practical Guide to Software Modelling, 1st edition, Pearson Education, Inc., USA, 2007.
3. Sommerville, I., Engineering Software Products: An Introduction to Modern Software Engineering, 1st edition, Pearson Education, Inc., USA, 2019.

APPENDIX 1. UML Sequence Diagrams

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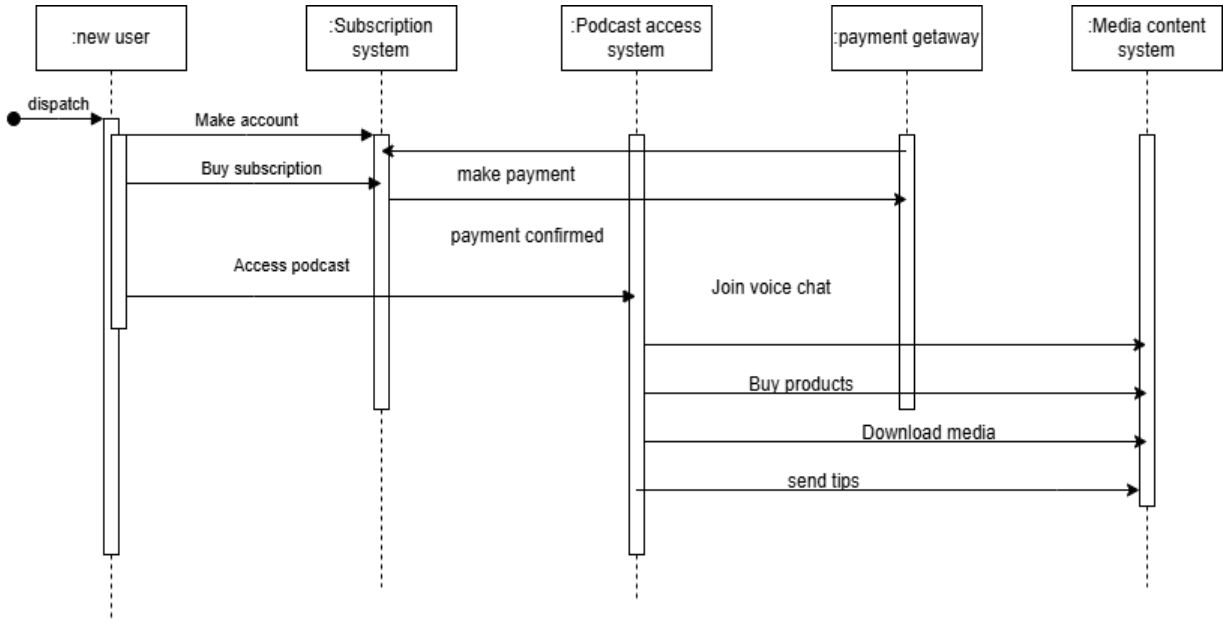
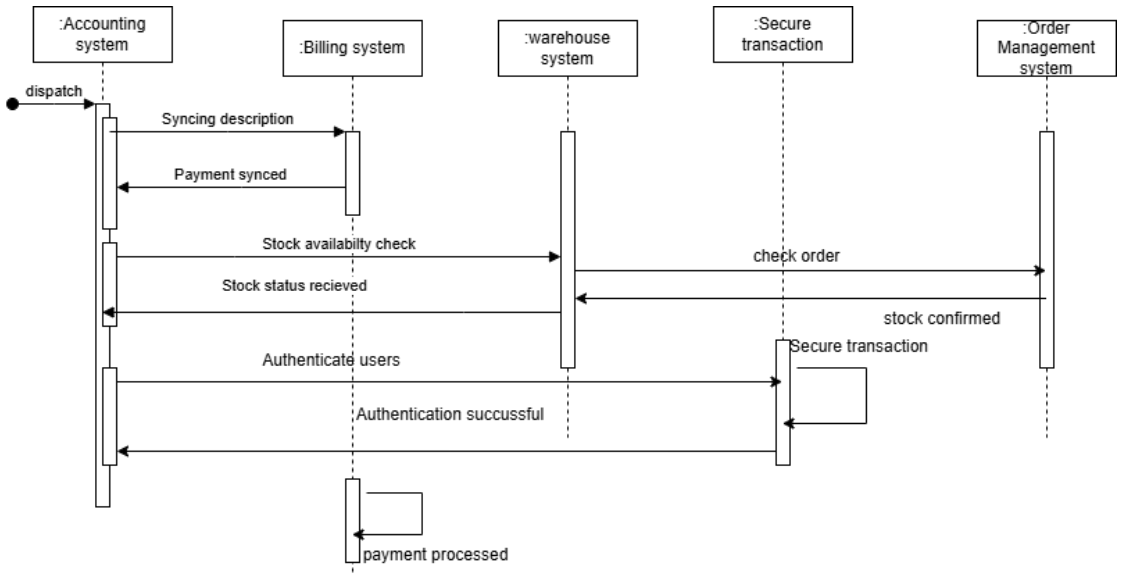
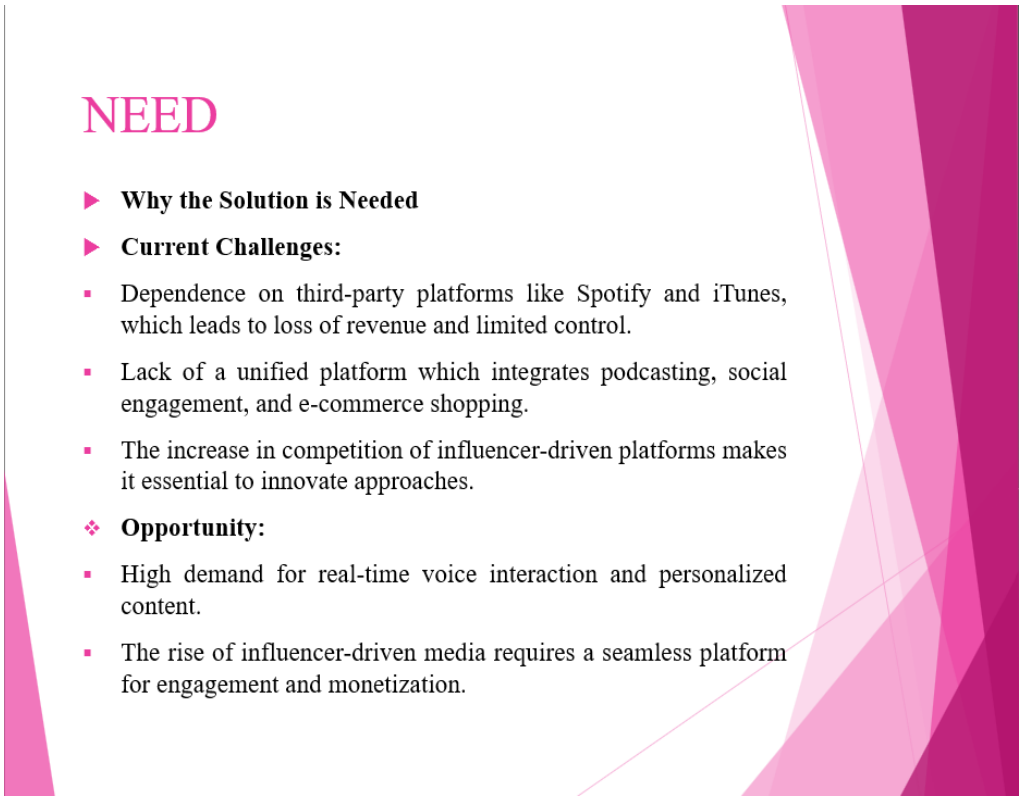




APPENDIX 2. Pitching Deck



APPROACH

- **How Our Solution Works**
- **Features:**
  - Real-time Voice Chats: Centralized hub for influencer-fan interaction.
  - Podcast Subscriptions: The new features made the search, streaming, and offline downloads user friendly.
  - Integrated E-commerce: Purchase merchandise directly within the platform.
  - Personalized Advertisements: The ads are targeted based on user behavior.
  - Cross-Platform Compatibility: Uniformity of experience across devices.

BENEFITS

- **Why This Solution is Valuable**
- **For MediaFun:**
  - The benefit of Unified platform is that it provides merged services, reducing third-party dependency.
  - The revenue will be through direct e-commerce and ad systems.
  - Integrated analytics provide actionable insights for content and ad performance.
- **For Users:**
  - Seamless, engaging and attractive experience uniting interaction, content consumption, and shopping together.
  - The option of Offline download and access for flexibility and convenience.
  - Inclusive accessibility features ensure usability for all users.

COMPETITION

- **Why Our Solution Stands Out**

Competitors:

- Currently Spotify, iTunes, and standalone apps presents limited features.
- E-commerce platforms are lacking the interactive and social elements.

Our Edge:

- Integrated Features like social interaction, streaming, and e-commerce are present in one platform.
- Personalized Experience: Ads tailored to your likeness, accessibility, and cross-platform support.
- Scalability: The Architecture can handle high traffic seamlessly.

Future-Ready:

- Evolves with trends like AI-driven personalization.