

# Smart Education Events System

SOEN 343 Section WW:  
Software Architecture and Design

Lab Section WL -X

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# 1. Project Definition

## 1.1 Project objectives

The objective of this project is to create an education-focused event planning and management system that provides an intuitive and efficient platform for organizing, managing, and participating in educational events. Key features of the system are:

- **Comprehensive Event Management:**
  - Organizers can create, manage, and schedule educational events with venue details and calendar integration.
- **Attendee Engagement Features:**
  - Live chat rooms, polling, and networking features to foster active participation.
- **Marketing & Promotion Tools:**
  - Tools to help event planners and stakeholders communicate ongoing and future events effectively.
- **Real-Time Analytics & Reporting:**
  - Track event success metrics, attendee engagement, and feedback to improve future events.
- **Secure Payment and Budgeting:**
  - Seamless integration of secure online payment and budget management functionalities

## 1.2 Methodologies

We will follow Agile methodology, with Scrum principles, and respect the Software Development Lifecycle, which includes planning, analysis, design, implementation, testing, and maintenance. The structure ensures it meets stakeholder demands and meets deliverable times.

### 1. **Planning and Analysis:**

- Define the problem and outline system requirements.
- Create detailed diagrams, such as context diagrams, class diagrams, and domain models, to identify system components.

### 2. **Design:**

- Design the system architecture the application will follow and be built upon.
- Design user interface (UI) for organizers, attendees, administrative users, and stakeholders to create an intuitive user experience.

### 3. **Implementation:**

- Build core features such as event planning and scheduling, event promotion, and Resource management.
- Integrate additional features like an AI-powered session recommendation.

### 4. **Testing:**

- Test the system rigorously to ensure it meets the outlined requirements and is bug-free.

### 5. **Maintenance:**

- Perform continuous improvement and maintenance according to user and stakeholder feedback.

## 1.3 Team Structure

The team is divided into small groups of pairs, each group being multi-faceted and flexible to meet the needs of the project as development continues. Massimo Caruso is the team lead, who will be assigning the tasks and managing the repository. The teams are as follows:

- **Jammie and Vlad – Front End.**
- **Alessandro and Gabriel – Back End.**
- **Massimo and Abdullah – Full Stack.**

Each member brings an asset to the team, and for this reason, roles have been specified, but not limited to, following that person's skill set.

- **Jammie Assenov:** Frontend developer responsible for UI/UX implementation using React.js.
- **Vlad Tita:** Frontend developer responsible for the modularization of components and integration of said components in the application.
- **Alessandro Tiseo:** Backend developer managing the server logic using Node.js and PostgreSQL.
- **Gabriel Rodriguez:** Backend developer specializing in databases, SQL queries, and noSQL queries.
- **Massimo Caruso (Team Lead):** Team lead overseeing project progress, ensuring quality assurance, and facilitating team communication. Full stack developer specializing in API integration, creating routes between the backend and the frontend, as well as creating components to integrate into the application.
- **Abdullah Taha:** Full stack developer focusing on real-time features and data visualization expert, handling Socket.IO, analytics, and dashboards.

Teams will meet once a week to discuss progress, and the entire team will hold two scrum meetings per week to review completed tasks and plan upcoming sprints.

## 1.4 Deliverables

- **February 6:** Problem definition, context diagram, and domain model
- **March 6:** System architecture with sequence diagram
- **March 27:** Refinement of architecture, design patterns and implementation
- **April 8:** Testing, implementation, and finalization of the project deliverables

## 1.5 Project Scope

The project will focus on design principles and key software development methodologies, including:

- **User Authentication and Authorization:** including role-based access control.
- **Data Management:** Utilizing a database for users, event creation and management features, and secure payment and financial tracking system
- **Real-Time Systems:** Implementing an AI-powered session recommendation system, among other features.

The initial phase emphasizes diagrams, design, and structure to create a clear roadmap for development. The project will evolve during later sprints, moving into implementation and testing. While initially designed for local events, scalability will be considered for future expansion.

## 2. Problem Definition

### 2.1 Problem statement

Education is one of the many pillars of a well-functioning society and is an important wellspring of growth for the youth and for those who want to expand their knowledge. Planning such events can seem daunting due to the multiple tasks an organization must plan to have a successful event, such as scheduling, registration, promotion, resource allocation, and much more. There are a few events planning systems such as **Eventbrite** for example, but none seem to focus on education. By dialing in on education, we can innovate how users and planners interact with the system. The lack of competition in this field has caused innovation to remain stagnant. In most cases, other event systems do not have any means for learners to dynamically interact with each other and the content of the events. Learners run into the issue of not being aware of future events or networking opportunities given by event planners.

Oftentimes events can take a lot of time to plan and can cause planners to miss deadlines and in the worst case they might have to push an event to a further date which could be economically devastating for stakeholders, this is often caused by not having an all-in-one way of planning, scheduling and processing payments.

An important thing that stakeholders miss out on is insights to evaluate the success of their event and possibly data to improve future events, which most event planning systems do not have. The lack of insight makes it so that most events do not innovate on their content and can seem unoriginal.

Most event planner web applications don't seem to have a diverse event format, for example being able to plan in-person, online, and hybrid types of events, which potentially limits the scale of the event.

These challenges highlight the need for a scalable and feature-rich platform that could help enhance education and motivate stakeholders to continue investing in educational events.

## 2.2 Proposed Solution

To address the challenges faced in organizing and managing educational events, we propose the development of the SEES (Smart Education Event System). This platform is designed to centralize all aspects of event management, offering tailored tools to meet the needs of organizers, participants, and stakeholders.

SEES will provide robust tools for creating detailed event agendas, managing venue bookings, and organizing in-person, online, and hybrid events. A role-based access system will ensure that users have appropriate permissions, allowing attendees to sign up and pay for events, while organizers can plan, reserve venues, and handle event-related payments within the same platform.

Additionally, SEES will include an event promotion and marketing tool to keep users informed about current and upcoming events. Reporting tools will provide valuable real-time analytics, such as registration trends, attendance, feedback, and engagement data. The system will also support secure payment and budget management tools to ensure consistency and efficiency.

## 2.3 Advantages

- **Enhanced Accessibility:** SEES simplifies event planning and management, making it easier for educators and learners to access and organize educational events.
- **Improved Networking:** Event-specific chat rooms will encourage interaction, ensuring participants actively engage with the content rather than just passively listening. This feature gives SEES a competitive edge by fostering deeper connections and encouraging users to return for future events.
- **Marketing and Promotion:** Organizers will have tools to keep in touch with participants, ensuring they stay updated with upcoming events.
- **Data-Driven Insights:** Real-time analytics will help stakeholders track attendance, engagement, and feedback, allowing for informed decision-making.
- **Secure Transactions:** The inclusion of secure payment and budget management features ensures financial efficiency and trust in the platform.



## 2.4 Advantages of Our Solution Compared to Existing Ones

Our platform offers clear, investor-friendly benefits that address market gaps:

- **AI-Powered Session Recommendations:** This unique feature offers a quick and easy solution to users wanting a fast way to find personalized matches for sessions recommendations.
- **Live Transcription & Real-Time Translation:** This is a feature we are thinking of implementing, when implemented this will bridge the gap between any language barrier present in any user.
- **Optimized Data analytics:** We are offering a new modern feel to the way we present user's data, making the whole experience more enjoyable and easier to approach.
- **Scalability & Reliability:** Designed for future growth, our system ensures reliable performance even as demand increases.
- **Secure and Seamless Payments:** Integrated, secure payment processing provides a frictionless experience for both users and the service we offer.

### 3. Technology Used

#### Node.js

- **Full-Stack JavaScript:** It allows the same language (JavaScript) to be used on the front end (React.js) and back end, streamlining development and improving team collaboration.
- **Rich Ecosystem:** With npm, Node.js provides a vast library of packages and tools to speed up development.
- **Real-Time Applications:** Excellent for projects requiring real-time features like chat applications or live updates.

Pros:

- Ideal for developing microservices and APIs.
- High performance for scalable applications.
- Lightweight and efficient due to non-blocking I/O.

Cons:

- Lightweight and efficient due to non-blocking I/O.

#### React.js

- **Component-Based Architecture:** React's reusable components simplify development and maintenance.
- **Virtual DOM:** Optimizes rendering performance for dynamic UIs, ideal for highly interactive projects.
- **Strong Ecosystem:** Extensive support for third-party libraries and a large developer community.

Pros:

- High performance for scalable applications.
- High flexibility and control over components.
- Easy to integrate with other frameworks or libraries.

Cons:

- Easy to integrate with other frameworks or libraries.
-

## Socket.IO

Socket.IO is going to be quite valuable for implementing real-time communication in our event management system. Here's how it aligns with one of our required features:

### Networking and Engagement:

- Power real-time **chat rooms** or **Q&A sessions** during events.
- Support live polls or interactive activities to engage attendees.

## Chart.js

Chart.js is a popular open-source library for creating charts and visualizations in web applications. It would be very useful for our solution since we need to make a dashboard with all the metrics for our stakeholders. One of our members (Abdullah) has used this technology for multiple projects and could help greatly in implementing this solution.

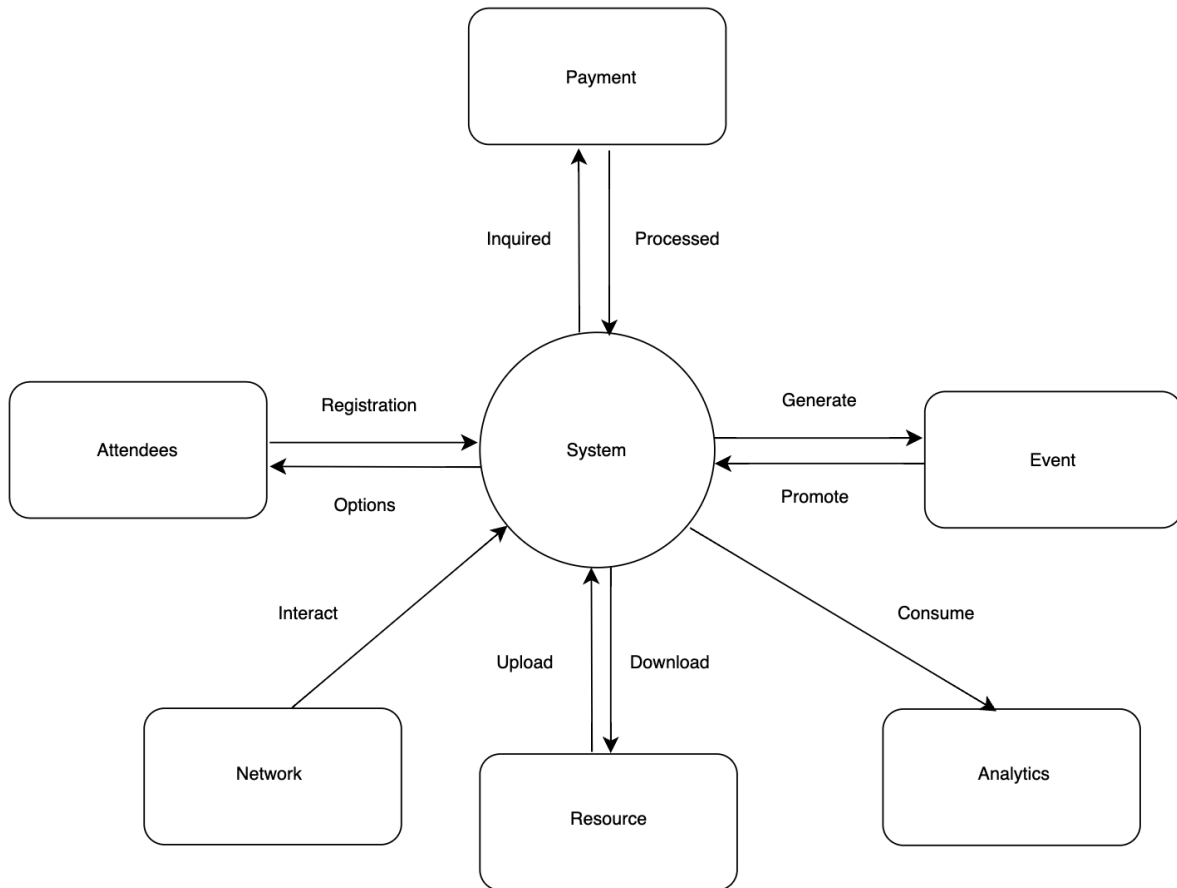
## Hybrid Approach Databases

For a comprehensive system like yours, a **hybrid approach** could be optimal:

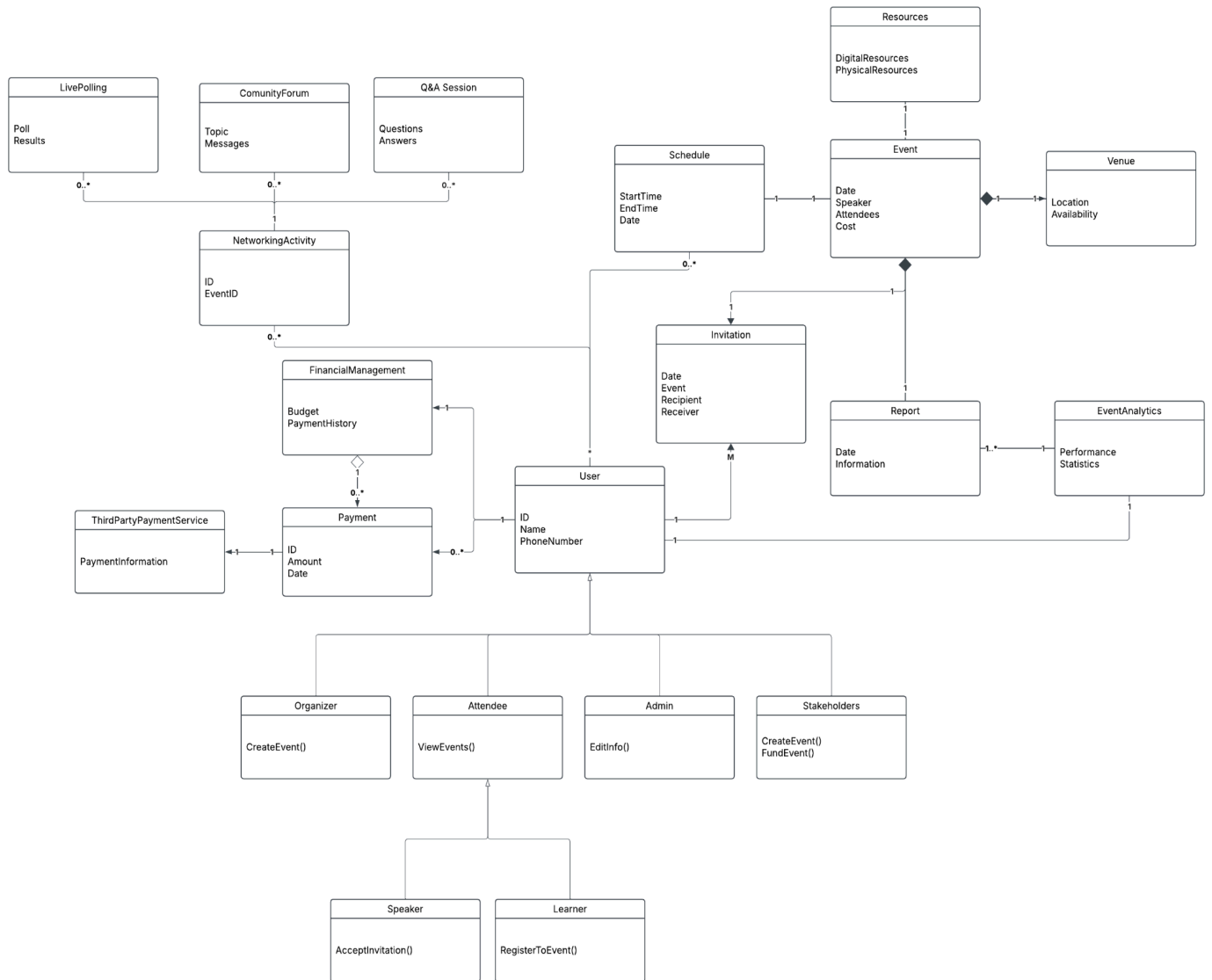
1. We use a **SQL database (e.g., PostgreSQL)** for core features that rely on relational data:
  - User accounts, Event schedules, attendees, payments, and resources.
2. Use a **NoSQL database (e.g., Neo4j)** for real-time or flexible features:
  - Chat systems, networking, or event promotions.

This allows us to leverage the strengths of both systems.

## 4. Context Diagram



## 5. Domain Model



## 6. Conclusion

The Smart Education Events System (SEES) is designed to streamline educational event management by providing an intuitive, feature-rich, and scalable platform. By addressing key challenges faced by event organizers, attendees, and stakeholders, SEES enhances engagement, improves networking opportunities, and provides data-driven insights to optimize event planning. With its secure payment system and diverse event format support, SEES offers a feature packed solution that empowers educators and learners alike, encouraging a culture of continuous learning and professional growth. More importantly, the application will contain additional features such as AI-Powered Session Recommendations and Real-Time Translation. Lastly, these distinctive features will provide a unique user experience that will differ from current market applications.