Elementary School Management System

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Problem

- Too many schools still do not utilize any form of management system.
- Teachers require efficient tools for data input and management.
- Current systems prioritize administrative needs over parental accessibility.
- Existing systems create barriers to parental engagement by focusing on administrative functions.

Objectives/Needs

- The objective will be to create a system to empower parents/students as well as providing a tool to help with teaching/administrative tasks.
- Schools need a solution that provides easy access to academic information for parents.
- The need for parent involvement in education is well recorded. We hope that with this tool we can empower parents to take an active role in their child's education. Additionally we hope to make a tool that can be useful for both teachers and administrators.

Broader Impact

- On individuals this tool will help students feel better supported, make parents feel more involved, make teachers waste less time on administrative tasks, and it will allow other faculty to do their job more efficiently in some cases.
- For organizations it can allow them to have greater control, tracking data, and transparency with their employees and students.
- Society will be helped because there will be larger class of confident educated individuals going into the workforce that will generate more money in their career and thus boost the economy more so than without a meaningful education.

Project Challenges

- **Database Development & Integration Challenges:**
  Experienced a learning curve in initializing, building, and connecting the database, which underscored the importance of earlier and more detailed planning. The complexity of the backend setup required substantially more time compared to the relatively simpler frontend development.
- **Technology Complexity Challenges:**
  Team members brought varying levels of proficiency across key technologies (JavaScript, SQL, HTML, CSS) and diverse tools (AWS, MySQL, javraylib, Lucid), requiring individuals to independently learn and adapt their skills, adding an additional layer of complexity to our project collaboration. Facing this, team members Gained practical insight into the complexities involved in integrating multiple frontend and backend technologies (React, Node.js, Express, MySQL) and achieving seamless interoperability.
- **Collaboration & Communication Challenges:**
  Quickly Recognized the importance of clear communication, especially when addressing technical issues, refining requirements, and integrating feedback. Mitigated these risks and developed hands-on experience with Agile methodologies and collaboration tools: used Trello for task management, Discord for rapid communication and troubleshooting, and GitHub for effective version control, greatly enhancing team alignment and productivity.

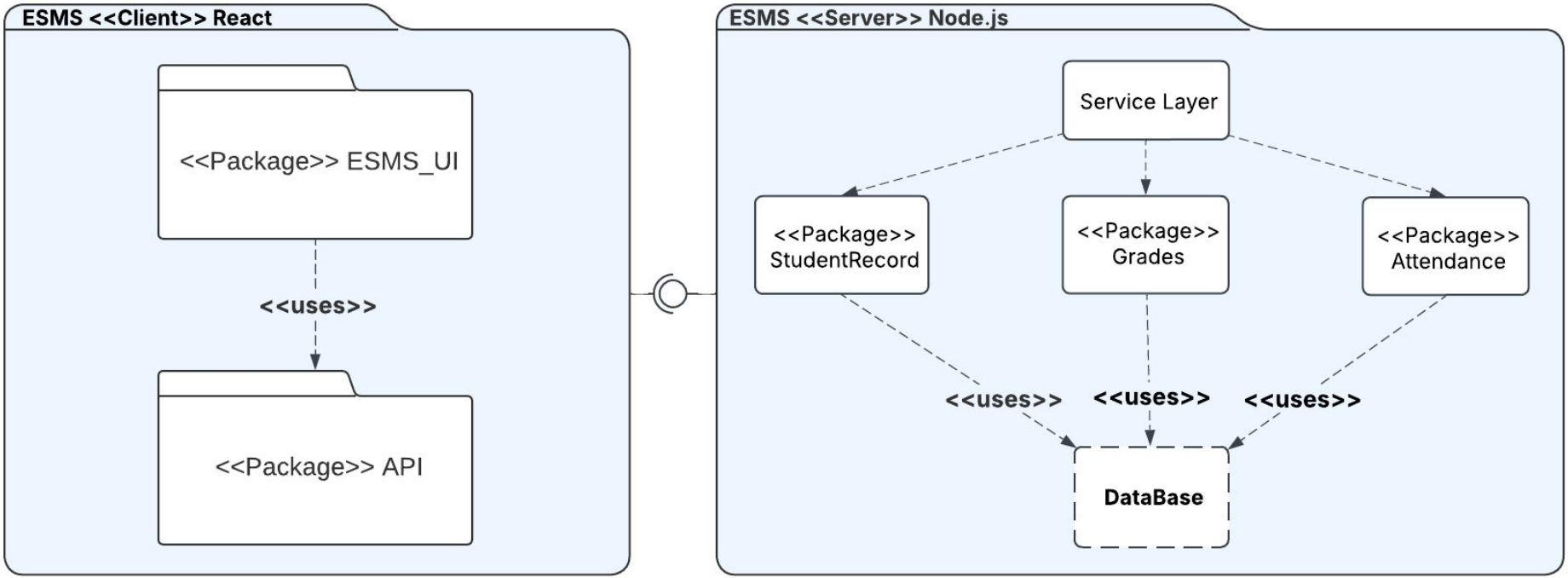
Original User Requirements:

User Functional: Gradebook

User Non-Functional: Securely store personal details in an easy-to-use, readable, interface.

Refined User and System Requirements:

- User Login and Role-Based Access Control
  - The system shall implement role-based access control to restrict access from unauthorized users using the users email and password.
- Student Records Management
  - The system will allow admins and teachers to update student records, while parents and students shall have read-only access.
- Course Management
  - The system shall allow teachers to create, manage, and organize course content (lessons, assignments, assessments, etc.) by subject, grade, and module.
- Gradebook Management
  - The system shall allow teachers to record, edit, and manage grades for assignments, tests, and projects.
- Attendance Tracking
  - The system shall provide an interface (using checkboxes or dropdowns) for teachers to mark student attendance in real time.
- Parent-Teacher Communication
  - The system shall provide a secure, two-way messaging platform for communication between parents & teachers, supporting text messages & attachments.
- Announcements Management
  - The system shall allow announcements to be targeted by grade, class, or school-wide.
- Alert Notifications
  - The system shall send alerts via email and SMS based on user preferences.


ESMS <<Client>> React
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ESMS <<Server>> Node.js
Service Layer
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StudentRecord
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Grades
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Attendance
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DataBase

Backend + Key Algorithms.

- Using Routes or API Gateways, our backend can handle the http request from the client and assigns them to their respective RESTful endpoints, which processes request, validates data and returns the appropriate responses. (GET,POST,PUT,DELETE)
- These Endpoints will then communicate with the database and allow the to execute raw SQL queries to our MySQL database and return the results.
- After querying the database, Hashmaps are used to temporarily store the retrieved values in an array and allow the client to system to quickly access and filter the data without overloading the database with request or queries.

Post-Project Reflection - Lessons Learned

- **Iterative Development & Agile Practices:**
  Appreciated the value of incremental development, frequent testing, and continuous integration for managing complexity and adapting to requirements.
- **Frontend Development & Open-Source Integration:**
  Experience using Material UI and open-source libraries significantly accelerated development, demonstrating the importance of efficient frontend integration techniques in future software projects.
- **Backend and Database Management:**
  Mastered maintaining data integrity, effective database schema design, and real-time data handling—essential skills for developing robust applications in professional settings.
- **Time Management:**
  Gained valuable experience balancing project milestones, unexpected technical challenges, and time constraints inherent in larger-scale projects

Post-Project Reflection- Summary

- **Security Foundation:**
  Successfully implementing and debugging RBAC provided invaluable insights into data security and permission management, highly applicable to real-world industry projects.
- **Agile Methodology:**
  Embracing incremental development and continuous integration equipped us with proven methodologies for managing complexity, crucial in delivering adaptive and responsive software solutions.
- **Intensive Troubleshooting:**
  Advanced troubleshooting skills, especially in state management, asynchronous operations, and handling edge cases, have substantially improved our preparedness for tackling complex, real-world development challenges.
- **Career Readiness:**
  Developed confidence in my abilities to handle complex projects independently, preparing me for real-world software engineering roles.

Video Demo

Thank You