Universidad Politécnica de Aguascalientes

Computer System Engineering

Mobile Programming

Integrator Project Progress

TEAM 3

Team members:

Leonardo Ausencio Martínez Torres UP210582

Sara Itzel Garcia Vidal UP210612

Leonardo Millán Jiménez UP210356

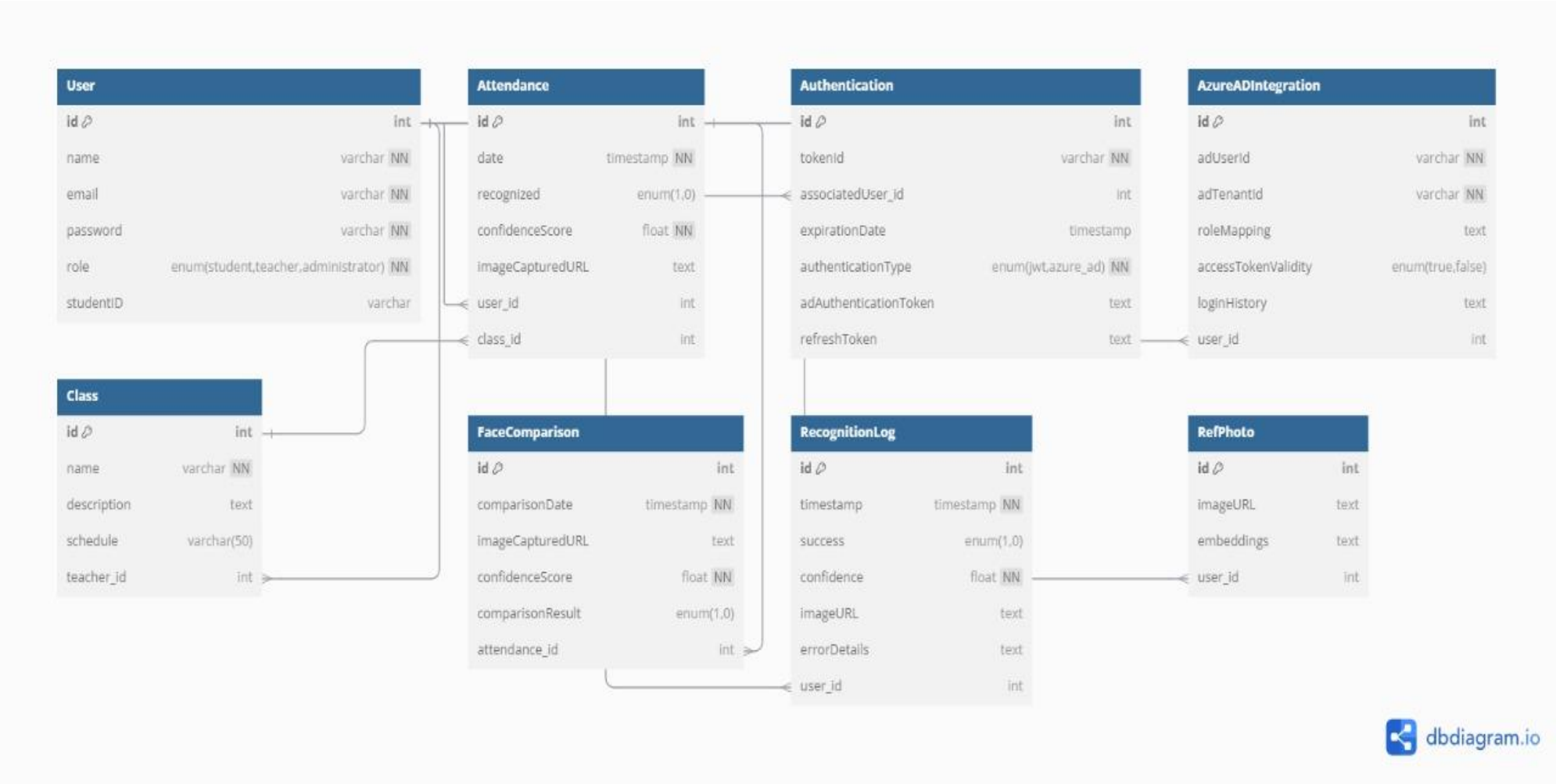
Juan Eduardo Rangel Macías UP220007

Emiliano Delfino De La Riva UP200173

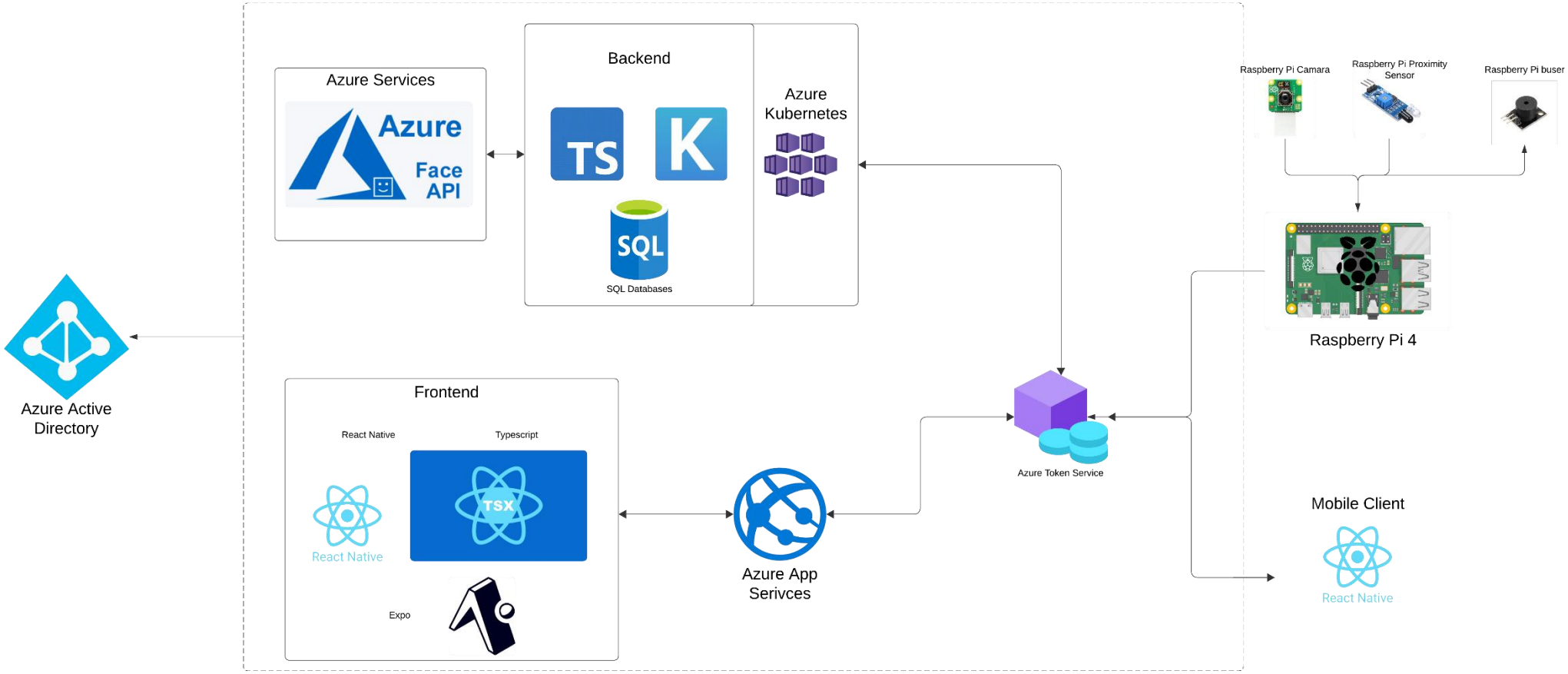
October 30th, 2024

Aguascalientes, Aguascalientes

Entity-Relationship Diagram (ERD)



Architecture Diagram and Integrations



Business Plan for ClassTrack: A SaaS-Based Facial Recognition Attendance Control Solution for Schools

---

1. Business Plan for SaaS Solution

Concept:

ClassTrack is a cloud-based attendance control system that leverages facial recognition technology to simplify and accurately track student attendance for schools and educational institutions. This solution automates attendance, minimizes errors in manual logging, and enhances student safety. Schools can monitor attendance in real time, manage records efficiently, and ensure seamless integration with existing school management systems.

- **Scalability as a SaaS Solution:** ClassTrack is easily scalable both nationally and internationally due to its cloud-based architecture and infrastructure on Azure, allowing institutions to add users without additional physical infrastructure. This flexibility is a key advantage for institutions looking to grow their enrollment or expand to other regions without logistical challenges.
- **Multi-Tenancy Options:** The SaaS platform supports multiple institutions within the same architecture while securely isolating their data. For example:
    - Each institution's data is stored separately within Azure SQL to ensure privacy and regulatory compliance.
    - Shared resources, like the AI recognition service and backend components, are efficiently distributed, enabling seamless scalability and reducing costs.
- **User Management for Educational Institutions:** Multi-level user management enables administrators, teachers, and students (or parents) to have different access levels to attendance records and analytics.
- **Clear SaaS Advantages:** ClassTrack provides the educational sector with reduced IT overhead, easy updates and maintenance from the provider's side, and scalability to handle growing student numbers without additional hardware investments.
- **Documentation and Training Resources:** ClassTrack includes documentation, onboarding, and training resources to ensure that schools can independently set up and manage their accounts, minimizing ongoing support needs.

Core Features:

- **Facial Recognition**: AI-based facial recognition ensures highly accurate attendance logging.
- **Real-Time Monitoring**: School administrators and teachers can track attendance in real time from any device.
- **Data Security and Compliance**: All images and data are encrypted and securely stored in the cloud. ClassTrack complies with educational data privacy regulations, ensuring that only authenticated users can access data, with secure integrations such as Azure Active Directory (AD).

- **Integrations**: Integrates with school information systems (SIS) for automated record-keeping.
- **Analytics Dashboard**: Provides insights on student attendance trends, punctuality, and more.

Technology Stack:

- **Front-End**: Built using **React Native**, making ClassTrack compatible with both mobile and web platforms, thus simplifying the user experience across multiple devices.
- **Back-End**: Uses **Keystone** as the backend framework, which enables fast development, flexible customization options, and a stable API for managing and querying data.
- **Infrastructure Management**: Hosted on **Azure Kubernetes Service (AKS)**, which supports high availability and scalability, automatically adjusting to usage demands, and ensuring consistent performance.
- **Database**: Uses **SQL** for secure, high-speed data querying and real-time data access, optimizing for institutions of all sizes.

Target Customers:

- **Schools**: Elementary, middle, and high schools needing secure and automated attendance systems.
- **Universities**: Colleges and universities that require efficient attendance control for large numbers of students.
- **Educational Institutions and Academies**: Training centers and educational academies looking for automated solutions.

---

2. Competitive Analysis

Competitors:
ClassTrack's primary competitors are other facial recognition and biometric attendance systems that also target the education sector. These competitors include established SaaS platforms with a focus on automated attendance tracking and data integration.

Competitive Landscape and Analysis:

Competitor	Technology	Strengths	Weaknesses
SchoolMint	Facial recognition SaaS	Robust reporting tools and SIS integration	Limited customization for different institution sizes
Kisi	Mobile &	Strong security features	

	biometric access	and device compatibility	Focuses on access control, lacks dedicated attendance tracking
RFID Attendance Systems	RFID-based	Reliable in controlled environments and cost-effective setup	Requires RFID cards for all students, lacks real-time monitoring
Prysm Cloud	Biometric + Cloud SaaS	Integrates biometric data with real-time reporting	Complex setup and higher initial costs

ClassTrack's Advantages Over Competitors:

- **Scalability and Flexibility**: While systems like **SchoolMint** are strong in SIS integration, ClassTrack offers multi-tenancy and a range of subscription levels that allow institutions of all sizes to adopt it with tailored functionalities and pricing.
- **Security and Compliance**: Unlike **RFID Attendance Systems** that rely on card-based tracking, ClassTrack provides secure, encrypted data storage and robust compliance with privacy regulations, a key advantage for schools concerned about data privacy.
- **Customizable Multi-Device Access**: ClassTrack's use of **React Native** and **Keystone** allows it to operate smoothly across devices (mobile and web) and adjust to different usage scales, outperforming competitors like **Kisi** that focus mainly on security access rather than holistic attendance tracking.
- **Ease of Setup and Use**: ClassTrack's streamlined deployment and flexibility with cloud infrastructure make it faster to implement than **Prysm Cloud** and reduce initial costs for smaller institutions.

Additional Comparisons (Traditional Methods): Traditional attendance methods, while cost-effective, are often unreliable and labor-intensive. Comparatively, ClassTrack's automated, real-time approach to attendance tracking eliminates manual logging errors, offering a higher level of accuracy and efficiency.

---

3. Advantages and Disadvantages

Advantages:

- **Efficiency and Automation**: Automated attendance saves time for teachers and administrators, allowing them to focus on educational tasks.
- **Increased Security**: Secure facial recognition reduces the risk of attendance fraud and enhances student safety.
- **Scalable Architecture**: Built on **Azure's AKS** and integrated with **Azure SQL**, the system handles high volumes of students with minimal latency.

- **Data Privacy Compliance**: Compliant with privacy regulations, ensuring secure and responsible data handling.
- **Cross-Device Compatibility**: Compatible with computers, tablets, and mobile devices, making it accessible in diverse educational settings.
- **Flexibility with Keystone**: The Keystone backend supports customization and flexibility in data management, a crucial advantage for institutions needing tailored solutions.

Disadvantages:

- **Privacy Concerns**: Facial recognition technology can raise privacy issues among parents, students, and administrators.
- **Dependence on Internet Connectivity**: Requires stable internet for real-time functionality, which may be challenging in some schools.
- **Potential Technical Limitations**: Low-quality cameras or poor lighting conditions could affect recognition accuracy.
- **Initial Setup Cost for Small Schools**: Smaller institutions may find the initial setup cost (cameras, installation) a financial consideration.
- **Data Privacy Regulations**: Privacy laws around biometric data vary, which may limit availability in some regions.

---

4. Market and Monetization Strategy

Market Size and Growth Potential: The educational attendance management market is projected to grow due to the rising adoption of digital solutions in schools and universities, especially in Latin America.

Target Market Segments: Schools and educational institutions across Mexico, focusing on elementary, middle, high schools, and universities.

Market Growth Drivers: Increased need for automation in schools, demand for student safety measures, and digital transformation in education.

Pricing Model:

- **Monthly Subscription-Based Model**: **Pricing is adjusted based on institution size and number of active students. The subscription model allows schools the flexibility to choose a plan according to their budget and requirements.**
    - Small Schools (up to 100 students): $90 MXN per student/month
    - Medium-Sized Schools (100-500 students): $70 MXN per student/month
    - Large Institutions (500+ students): Custom pricing with volume discounts.
- **One-Time Setup Fee**: Covers initial setup, camera costs, and system integration.

Customer Acquisition Strategy:

- **Direct Sales to Schools and Universities**: Focus on direct outreach to educational institutions, offering presentations and demos.
- **Digital Marketing Campaigns**: Targeted marketing through LinkedIn, Google Ads, and educational websites to reach school decision-makers.
- **Partnerships with Educational Hardware Suppliers**: Collaborate with suppliers to offer bundled packages, including cameras and setup support.
- **Demo and Free Trial**: Offer a 30-day free trial for schools to experience ClassTrack's efficiency.
- **Referral Program**: Encourage existing schools to refer other institutions through an incentive program.

Retention Strategy:

- **Customer Support and Training**: Provide free training sessions, comprehensive documentation, and 24/7 support to maximize user satisfaction.
- **Ongoing Software Updates and New Features**: Regular software updates based on customer feedback to ensure consistent value.
- **Feedback Loop with Schools**: Conduct regular surveys and feedback sessions to improve the product and address customer needs effectively.

Revenue Projections (First Three Years):

- **Year 1**: Target 50 small to medium schools, aiming for an ARR (Annual Recurring Revenue) of around $2,000,000 MXN.
- **Year 2**: Expand to larger institutions, reaching an ARR of $8,000,000 MXN with a broader customer base.
- **Year 3**: Establish a presence in other Latin American markets, aiming for an ARR of $20,000,000 MXN with over 300 schools as clients.