Analysing the Central Database of the Smart Student Card System

The central database for a Smart Student Card system will manages all the data related to students, their attendance, performance, and interactions with the school.

1. Database Structure and Components

Core Collections:

* Students:

Attributes: Student ID, Name, Date of Birth, Class, Contact Information, etc. (Stores all personal information about the students).

* Attendance:

Attributes: Attendance ID, Student ID (foreign key), Date, Time, Status (Present/Absent), Method of Check-in (RFID/NFC/QR).(Records daily attendance for each student.)

* Performance:

Attributes: Performance ID, Student ID (foreign key), Subject, Score, Exam Date. (Keeps track of academic performance, including grades and assessments).

* Parents/Guardians:

Attributes: Guardian ID, Name, Relationship to Student, Contact Information. (Stores contact details for guardians for notifications and communication).

* Notifications:

Attributes: Notification ID, Student ID (foreign key), Message, Date, Status (Sent/Unread). (Keeps records of notifications sent to students and parents).

* School Resources:
* Attributes: Resource ID, Resource Type (Library, kitchen, game etc.), Availability Status, Usage Logs. (This will be tracking the availability and usage of school facilities).

Relationships:

* One-to-Many:(Each student can have multiple attendance records and performance entries).
* Many-to-One:(Multiple students can belong to one class or have the same guardian).

2. Database Management Systems (DBMS) Choices

* PostegreSQL
* Mysql
* MongoDB:Suitable for handling unstructured or semi-structured data, such as logs from RFID/NFC systems and real-time activity tracking

3. Data Flow and Interactions

1. Student Entry and Attendance Tracking:

* When a student scans their Smart Card (using RFID/NFC/QR code), the following occurs:

The system reads the card data.

It checks the central database to validate the student’s identity.

Records the attendance (time and method) in the Attendance table.

Sends notifications to the parent/guardian if the student is absent.

2. Performance Monitoring:

* After assessments, teachers input scores into the system.
* These scores are saved in the Performance table, linked to the respective student.
* Reports can be generated for parents to show their child's progress over time.

3. Communication and Notifications:

* The system sends automated messages to parents regarding attendance, performance, or important school events.
* Notifications are stored in the Notifications table, allowing parents to view past communications.

4. Access Control and Security:

* Smart Cards not only track attendance but also control access to school facilities (like labs or libraries). The School Resources table tracks this usage.
* If a card is reported lost, it can be deactivated to prevent unauthorized access.

5. Features to Improve

* Parental Access Portal: Create a dedicated portal or mobile app for parents to access their child's information, including attendance records and performance reports.
* Automated Alerts: Implement automated alerts for parents when their child misses a class or when grades are posted.
* Behaviour Tracking: Include a feature to monitor and record student behaviour in addition to academic performance, providing a more holistic view of student welfare.
* Integration with Learning Management Systems (LMS): Sync data with LMS platforms to enhance the learning experience by tracking online participation and progress.