**High Level Architecture**

For the DIY Smart Lock based on Arduino, the high-level architecture involves integrating RFID technology with an Arduino to create a secure access control system. Here's a detailed breakdown of the high-level architecture for the DIY Smart Lock Project:

**1. Hardware Components:**

**a. Arduino Board:**

* **Type:** Arduino Uno (or compatible).
* **Function:** Central controller for processing RFID data, managing access, and controlling the lock mechanism.

**b. MFRC522 RFID Module:**

* **Function:** Reads RFID card data and communicates with the Arduino.
* **Connection:** Connected to specific pins on the Arduino for data exchange.

**c. LEDs:**

* **Colors:** Red, Green, and Blue.
* **Function:** Visual indicators for system status (access granted, access denied, admin mode).

**d. Resistors:**

* **Function:** Protects components, like the LEDs, from excessive current.

**e. MOSFET:**

* **Function:** Controls the solenoid lock, acting as a switch triggered by the Arduino.

**f. Solenoid Lock:**

* **Function:** Physical lock mechanism controlled by the Arduino to secure/unlock access.

**g. Power Supply:**

* **Voltage:** Typically 12V.
* **Function:** Powers the solenoid and Arduino.

**h. Breadboard and Wires:**

* **Function:** Provides a platform for temporary circuit connections.

**2. Interconnections:**

* The MFRC522 module is connected to specific digital pins on the Arduino.
* LEDs are connected to digital output pins for visual feedback.
* The solenoid is controlled by a MOSFET, connected to a dedicated pin on the Arduino.

**3. Software Components:**

**a. Arduino IDE:**

* **Function:** Used for programming the Arduino board.

**b. RFID Library (e.g., MFRC522 Library):**

* **Function:** Enables communication with the MFRC522 RFID module.

**c. Access Control Sketch:**

* **Logic:** Contains code for RFID card detection, authentication, access control, LED feedback, and lock control.
* **Structure:** Utilizes functions for different tasks (e.g., **accessControl()**, **authenticateCard()**, **grantAccess()**).

**4. Operation Logic:**

* The Arduino continuously checks for the presence of RFID cards using the MFRC522 module.
* Upon card detection, the system checks for the master card to enter admin mode or authenticates regular cards.
* Access is granted by activating the solenoid and displaying green LED feedback.
* Access denial triggers the red LED, followed by a delay and LED reset.
* Admin mode activates the blue LED, providing additional functionalities.



