A Secure Password Wallet based on the SEcube™ framework

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Department of control and computer engineering
Politecnico di Torino

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Why are hardware-based approaches more reliable?

To authenticate, Master password + Device are required

Outline

1. Introduction

2. Technologies used
   - ▶Software libraries
   - ▶The SEcube™ Framework

3. Design and implementation

4. Results
   - ▶Demos

5. Conclusions

6. Future Work

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Introduction

This work regards the implementation as a desktop application that exploits the capabilities of the SEcube™ (Secure Environment cube) hardware and software framework to store and protect passwords.

The desktop application, named **SEcubeWallet**, was written in C/C++and Qt, and it interacts with a SEcube™ device, requesting services like authentication and encryption/decryption of data.

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Dictionaries, keyboard patterns, sequences, years

The SEcube™ Open Security Platform

Hardware

Software

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Hardware

Developed by the Blu5 Group

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Family

- SEcube™ Chip
- SEcube™ DevKit
- USEcube™ Stick

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- **MCU:** STM32F4 (STM)
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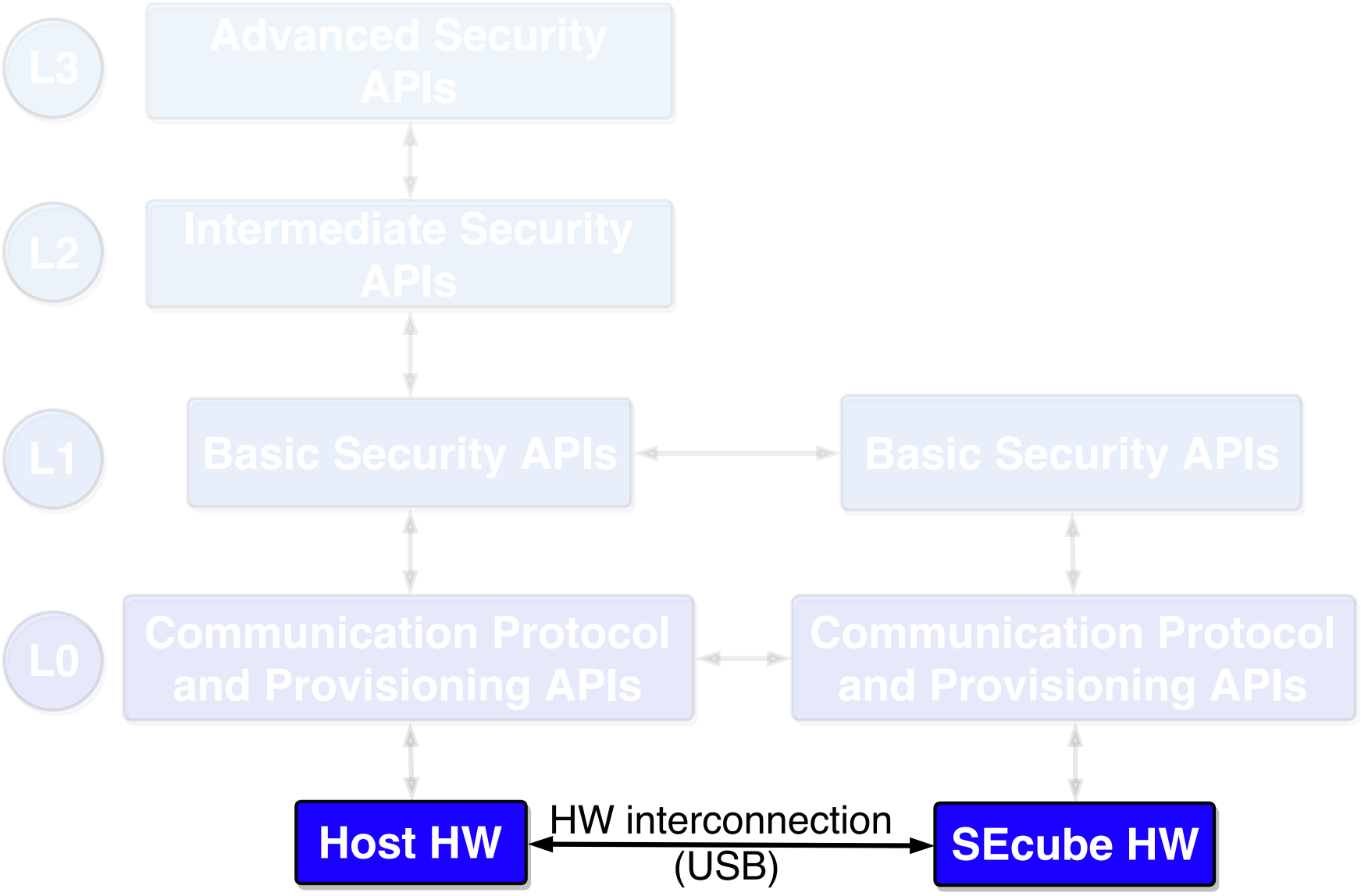
Host libraries: Allow to experience the platform as a high-security black box.

SEcube™ APIs hierarchy



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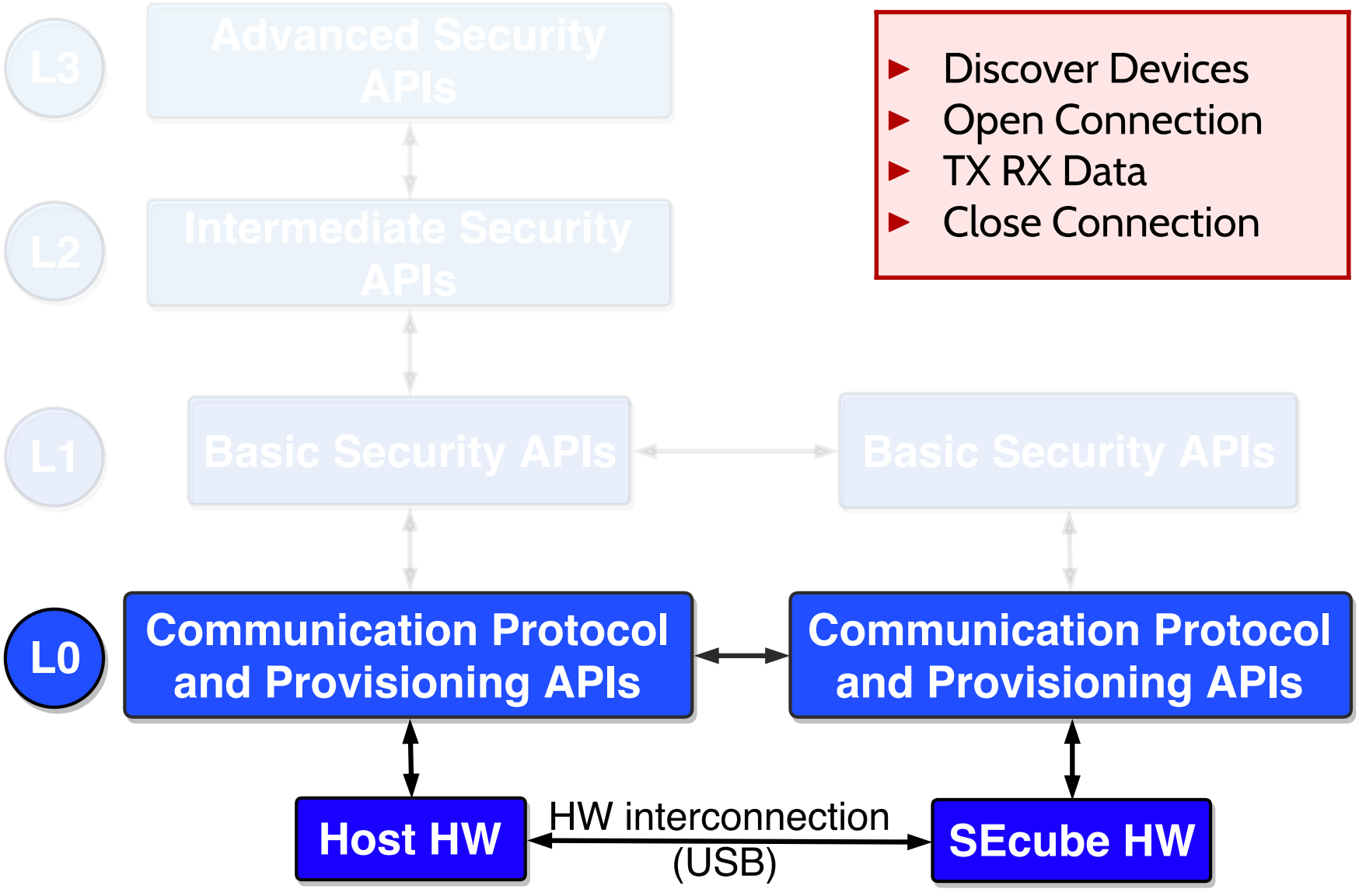

- Discover Devices
- Open Connection
- TX RX Data
- Close Connection

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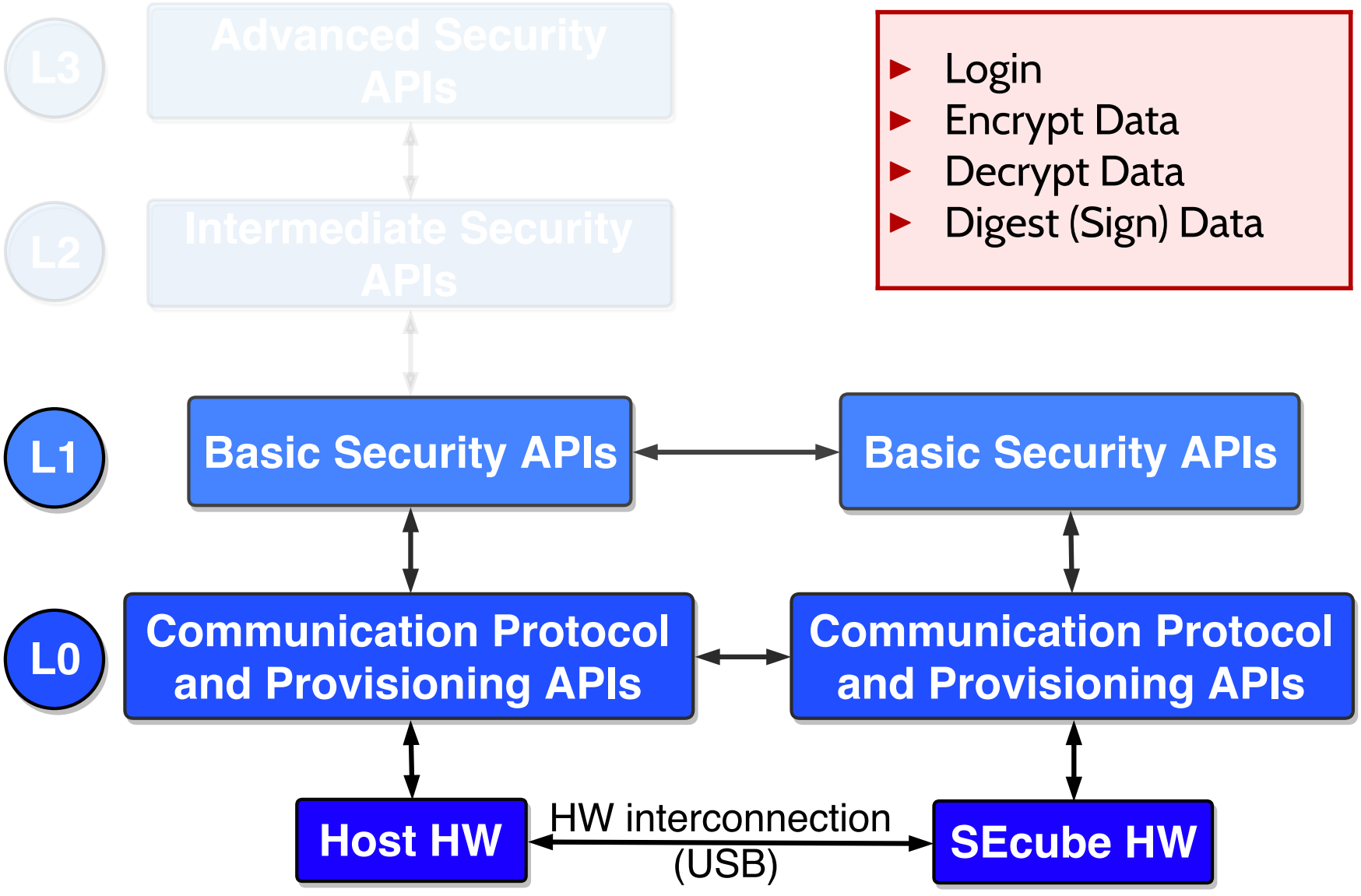

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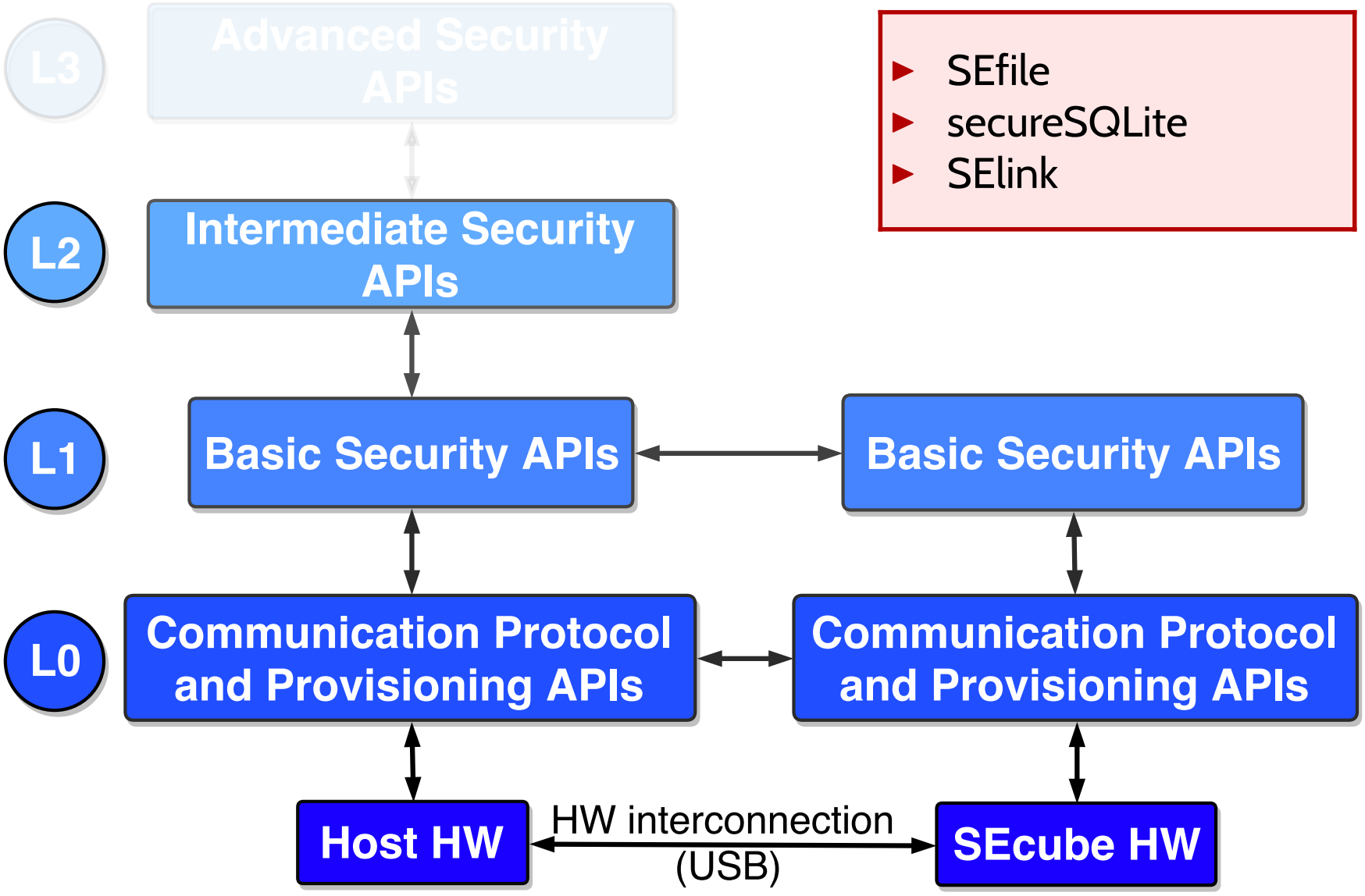

- SEfile
- secureSQLite
- SElink

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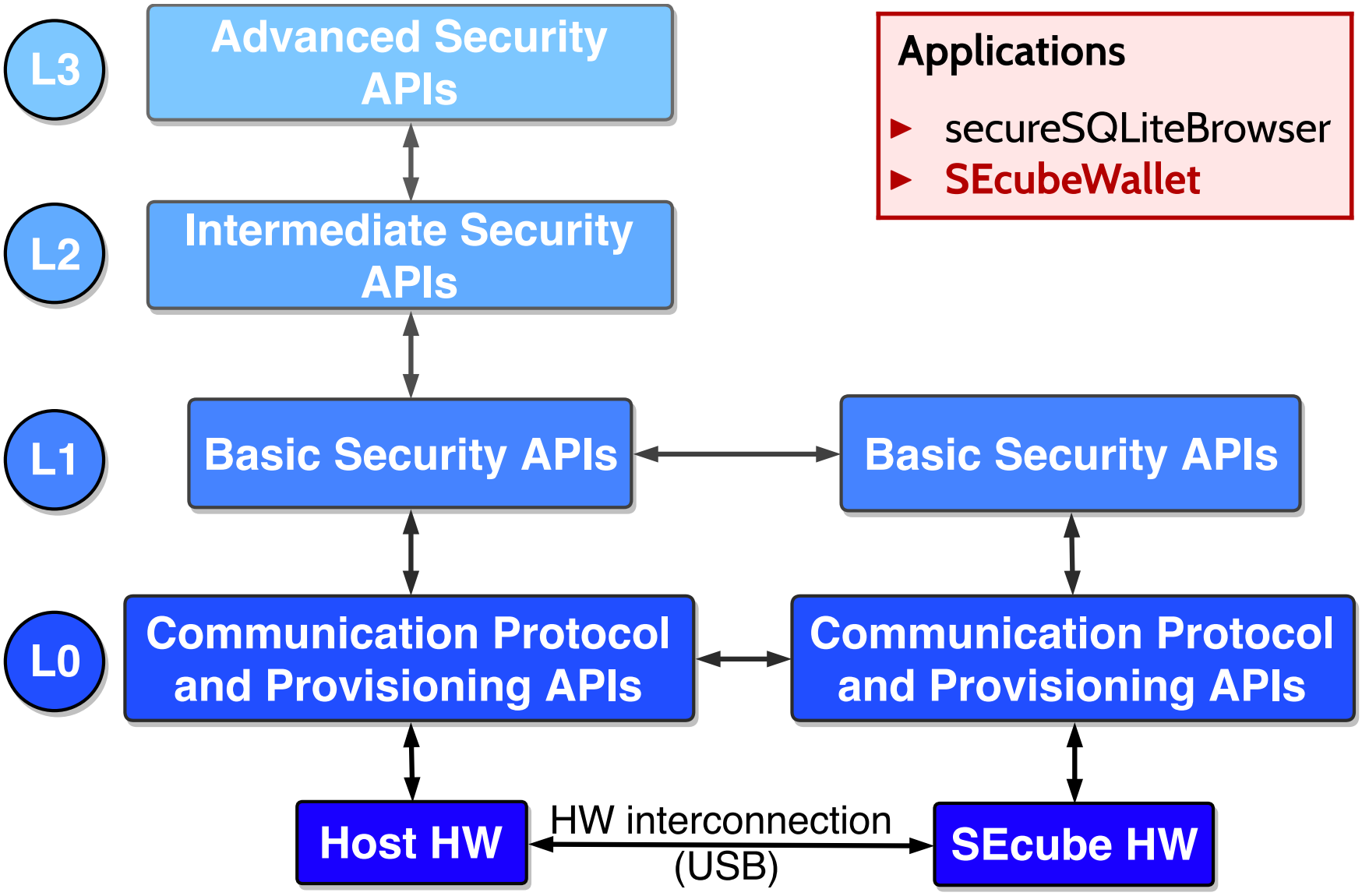

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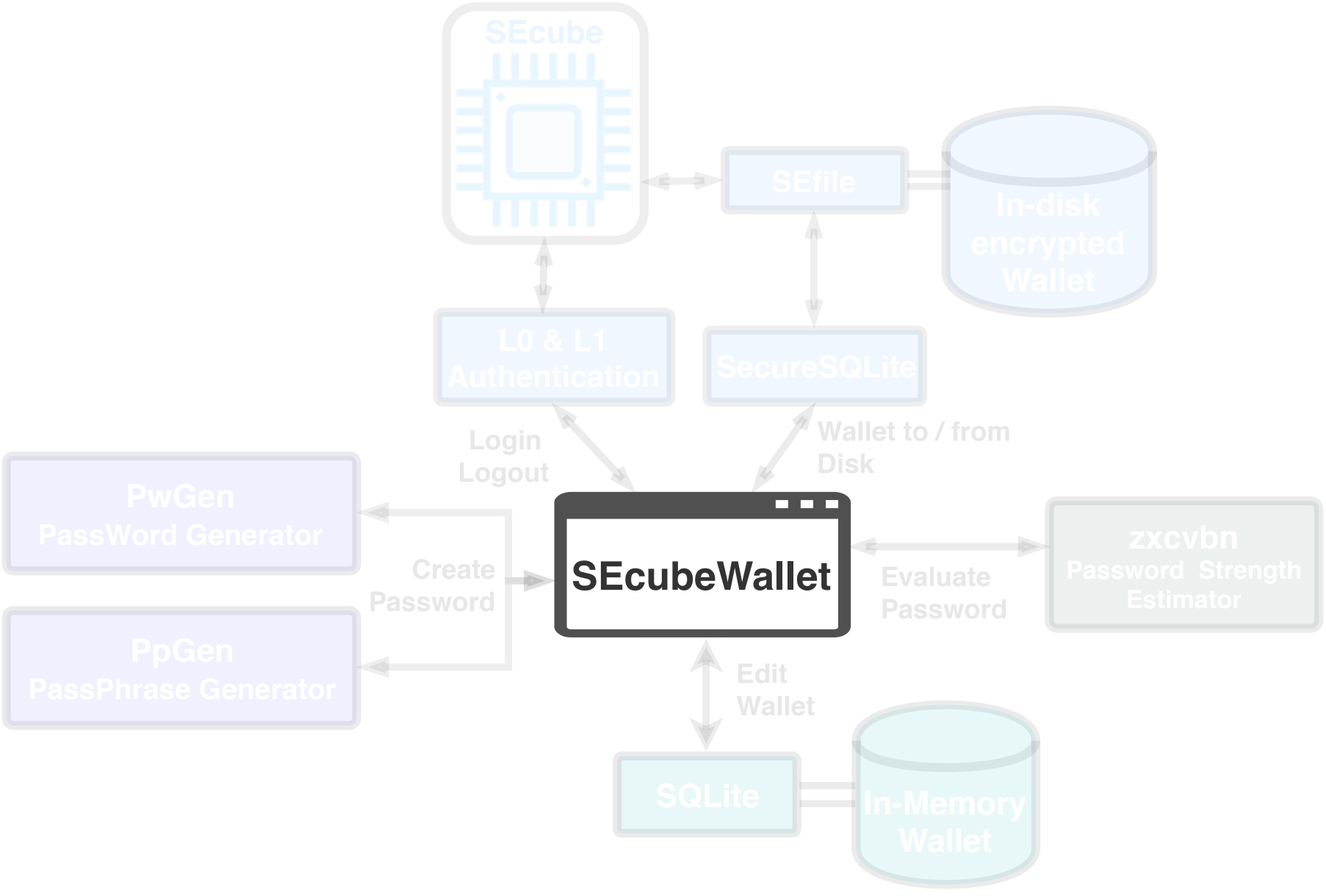
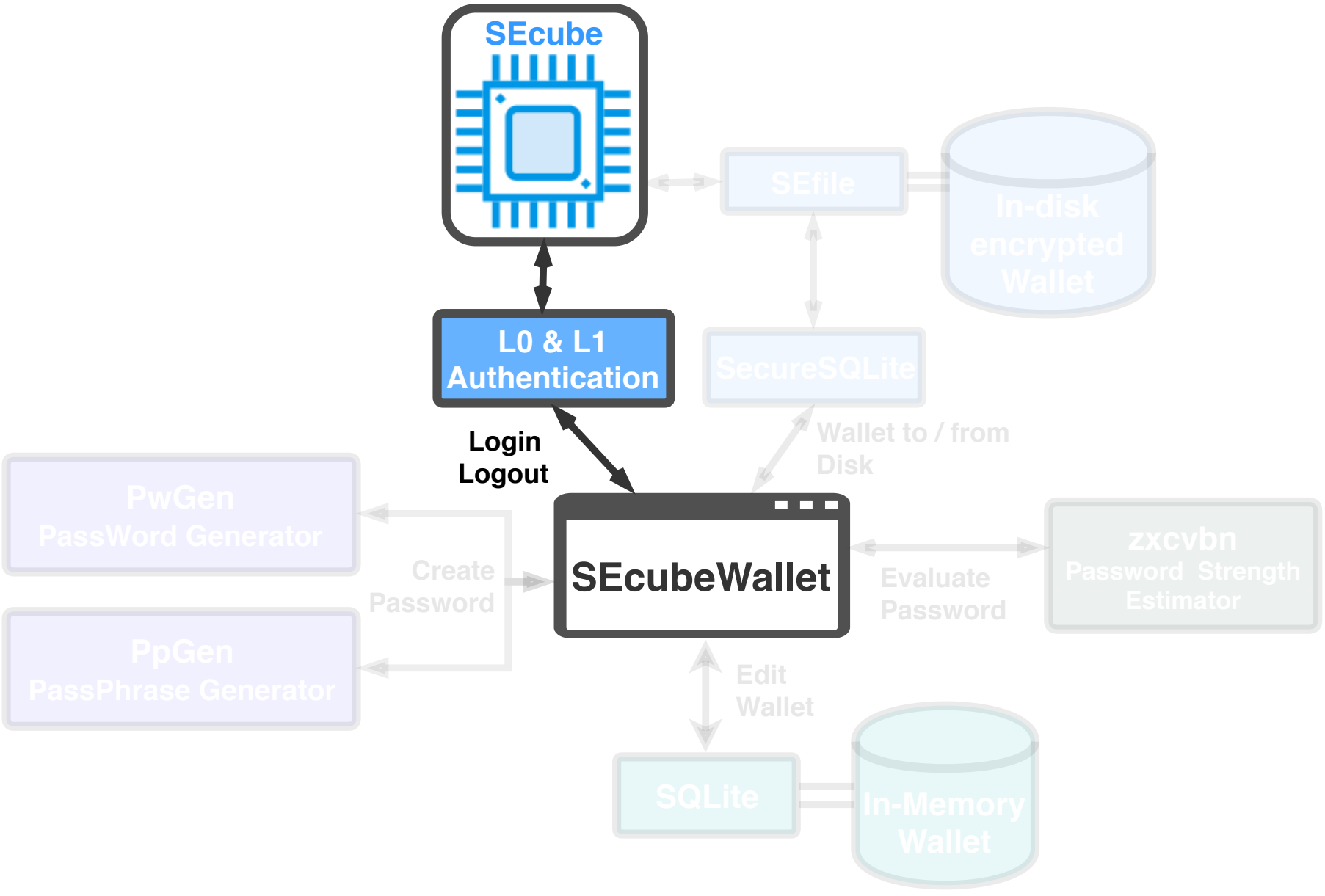
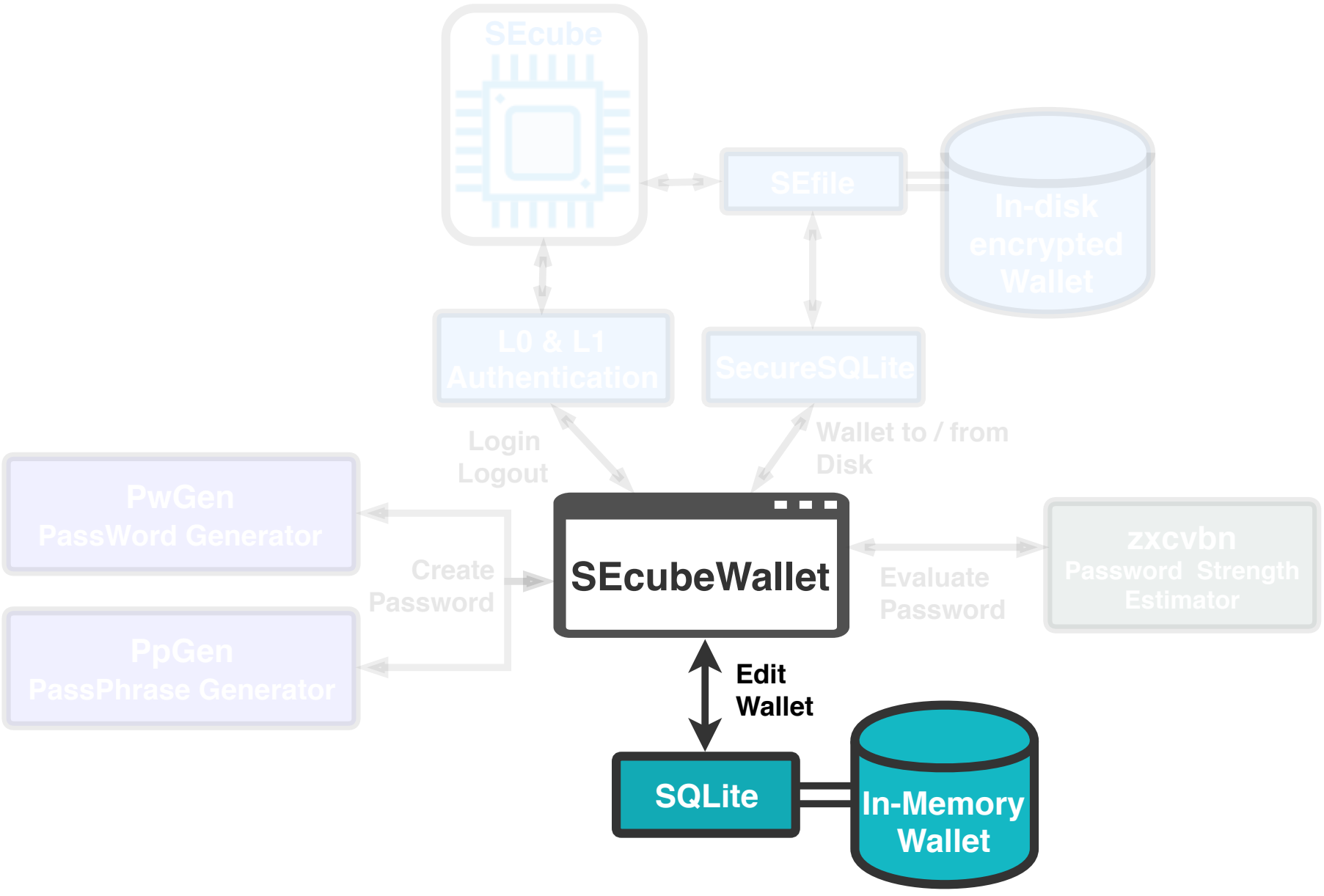
SEcubeWallet Application



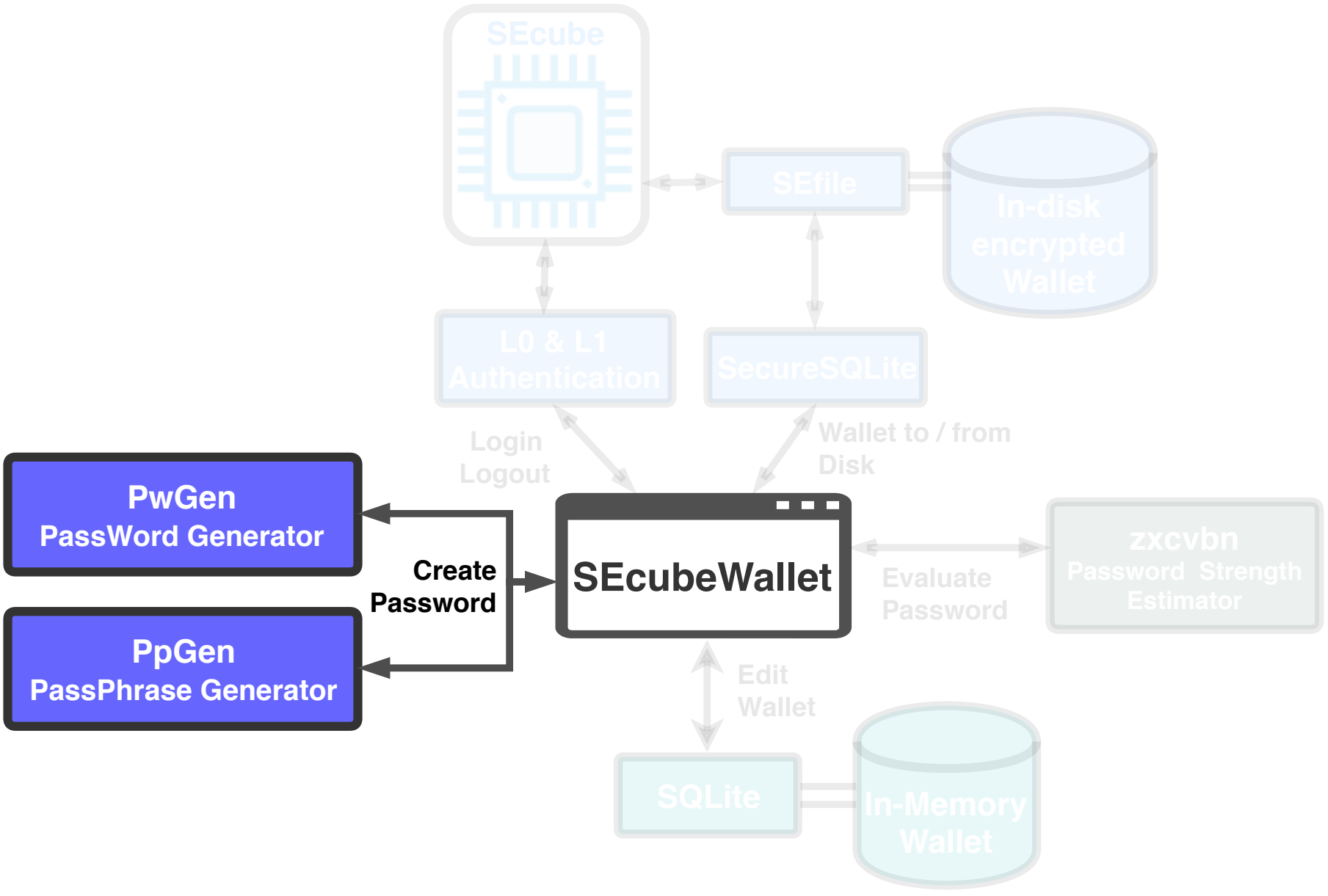
Open device and authenticate



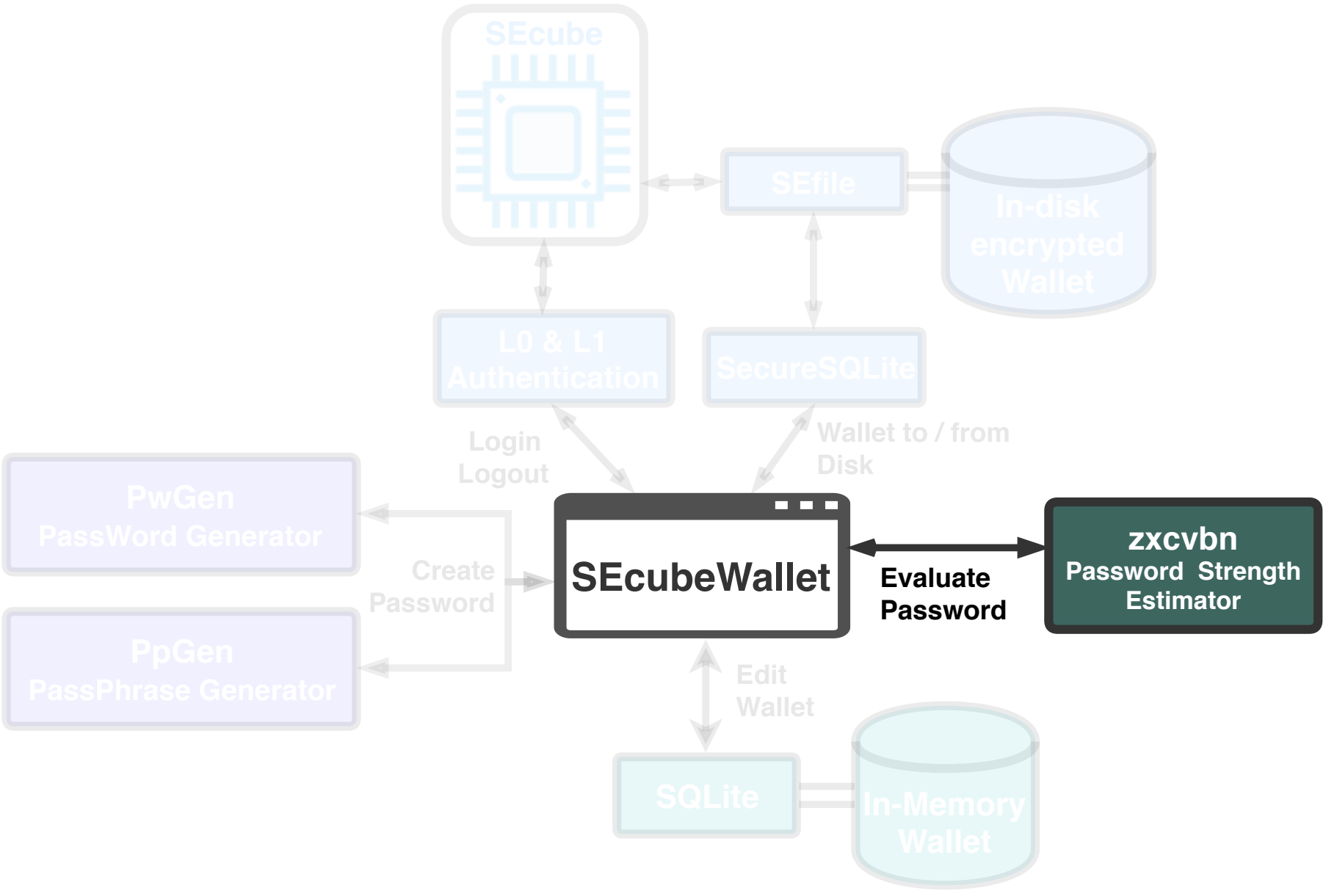
Create In-memory Wallet



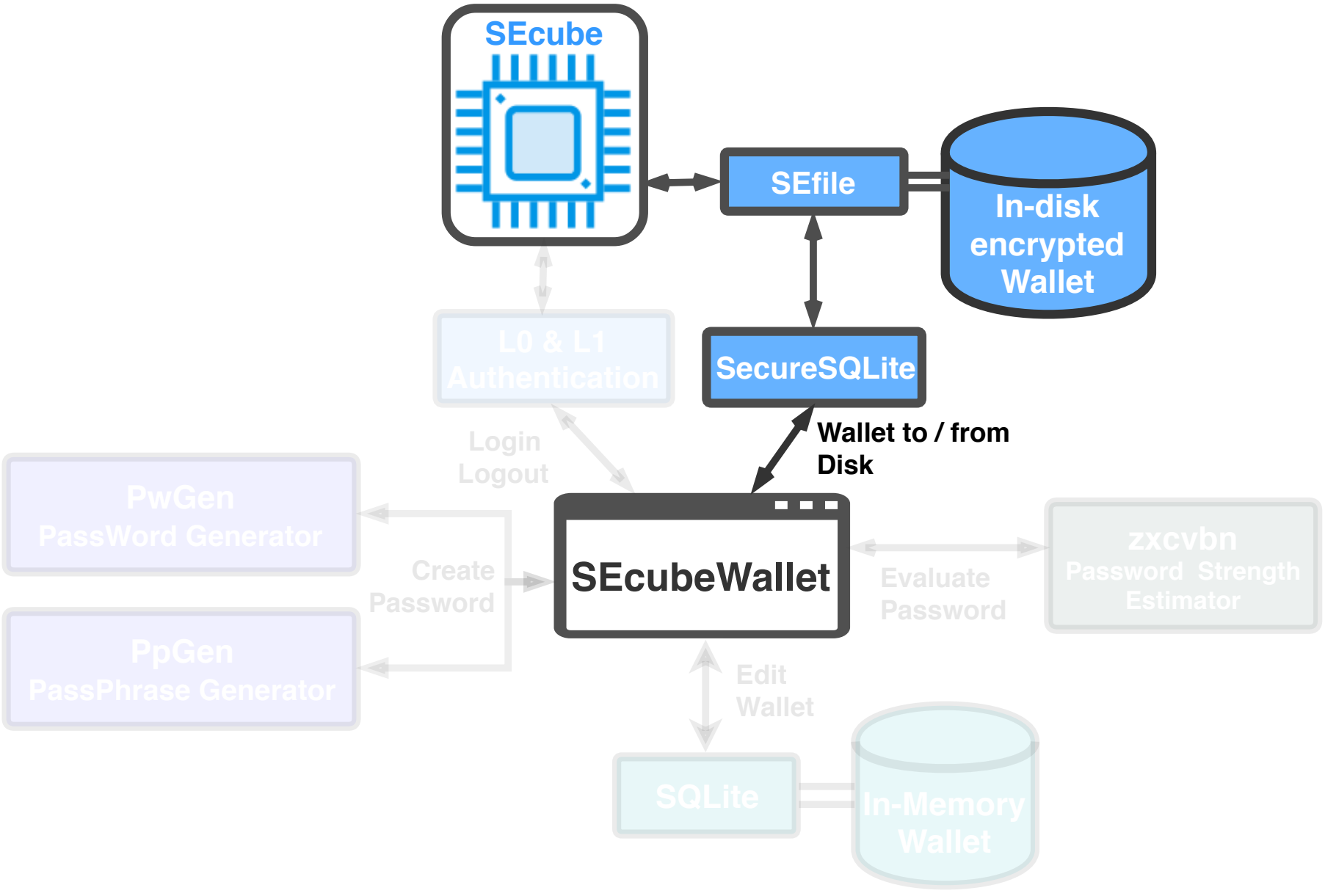
Generate Password/Passphrase



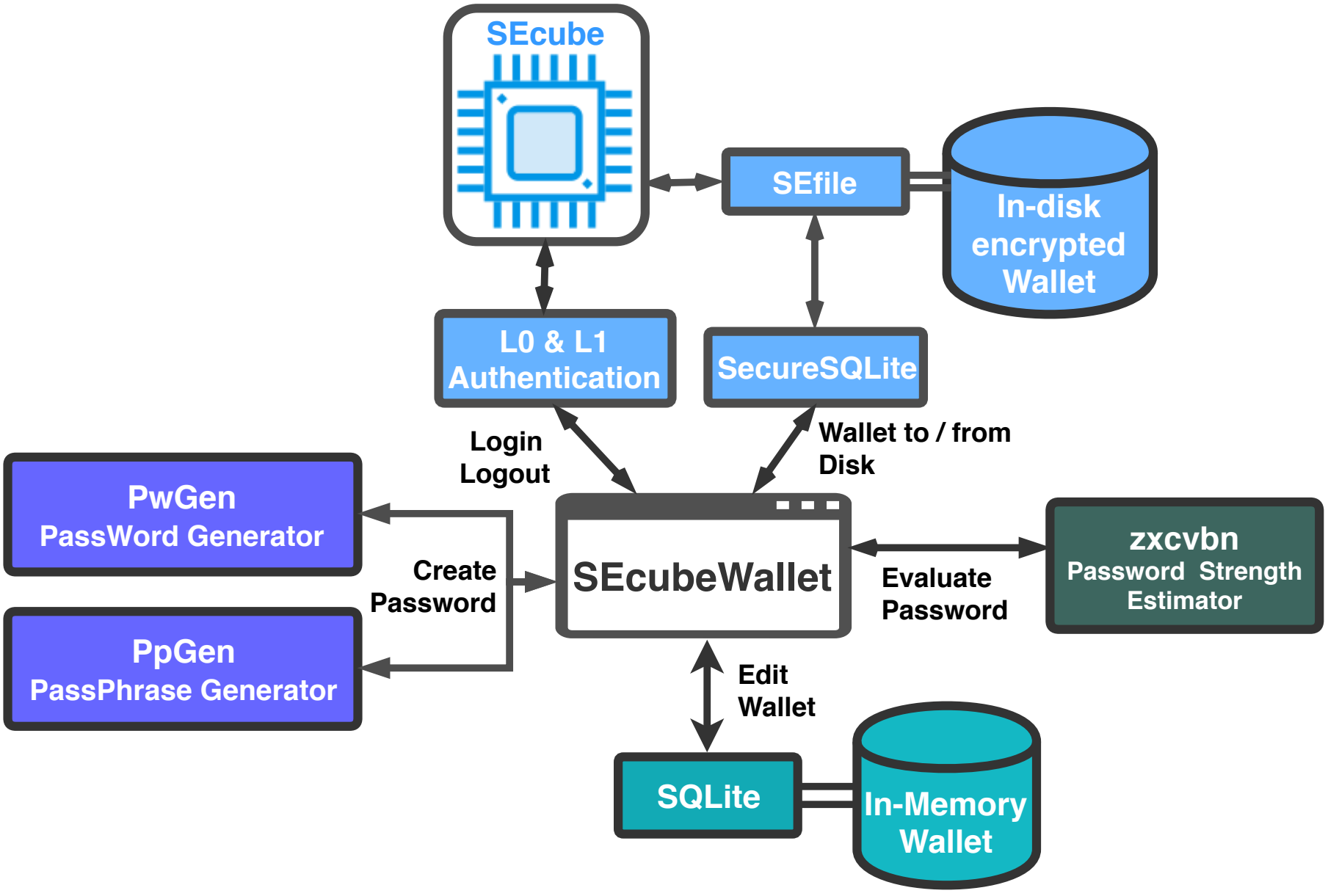
Evaluate Strength



Encrypt and Save Wallet to disk



General Architecture



Windows and display elements

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- Main Window
  - **Table View** for displaying the wallet entries
  - **Filters** So the user can search in each of the table's columns.
  - **Tool Bars** for Wallets, Tables and Entries.
  - **Menu Bar** with all the actions.
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- **Delete Wallet:** Both the In-memory DB and the In-disk encrypted file are deleted.

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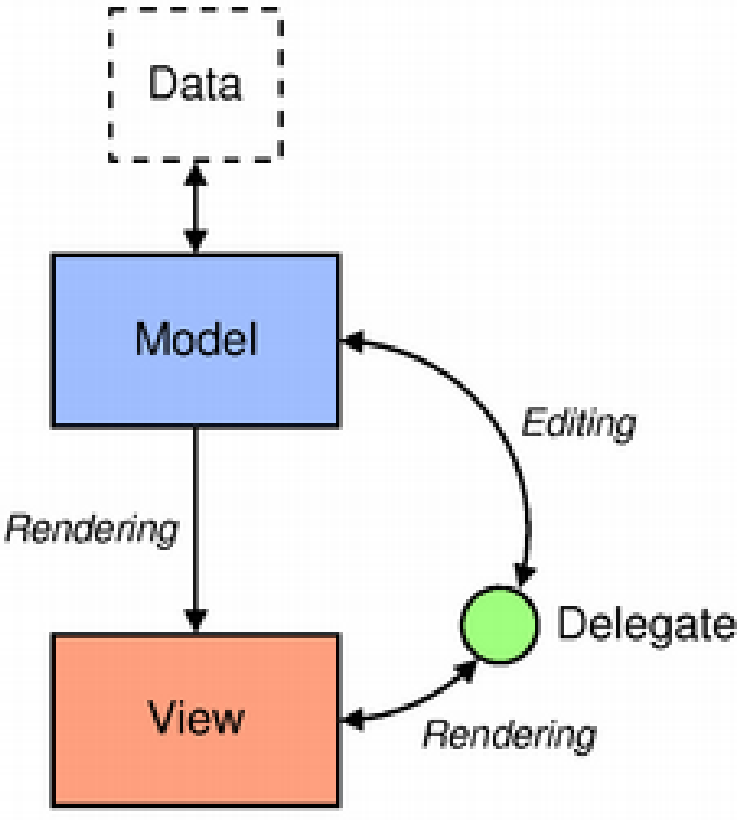

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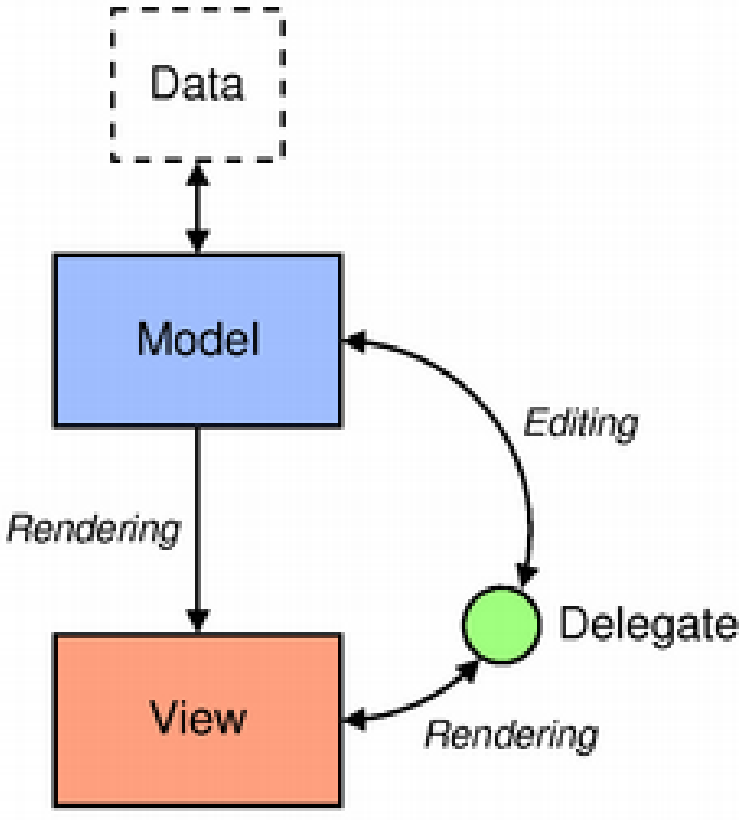

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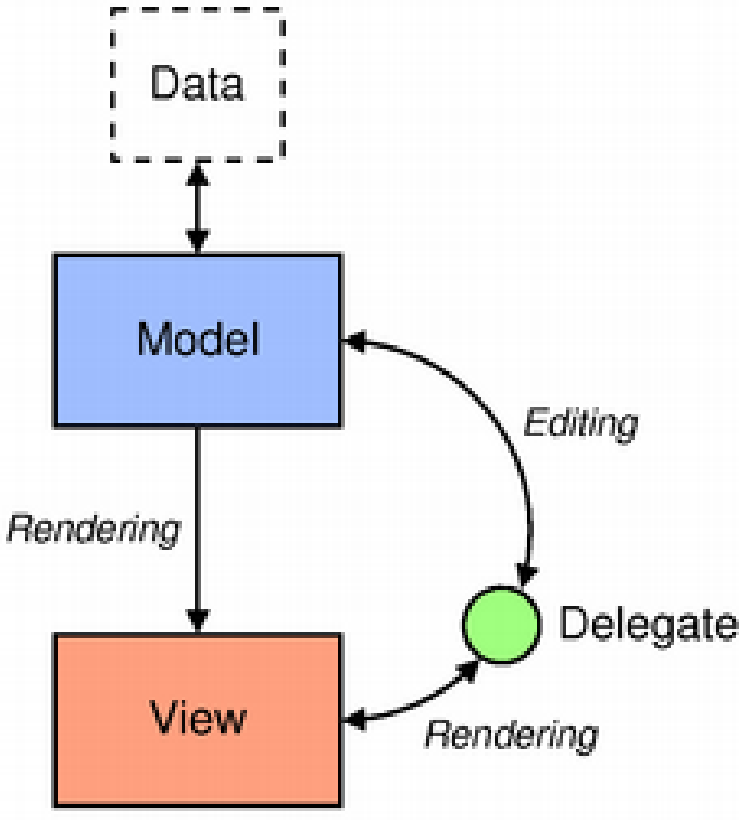

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- **Model**: Wrapper for handling SQLite DBs easily.

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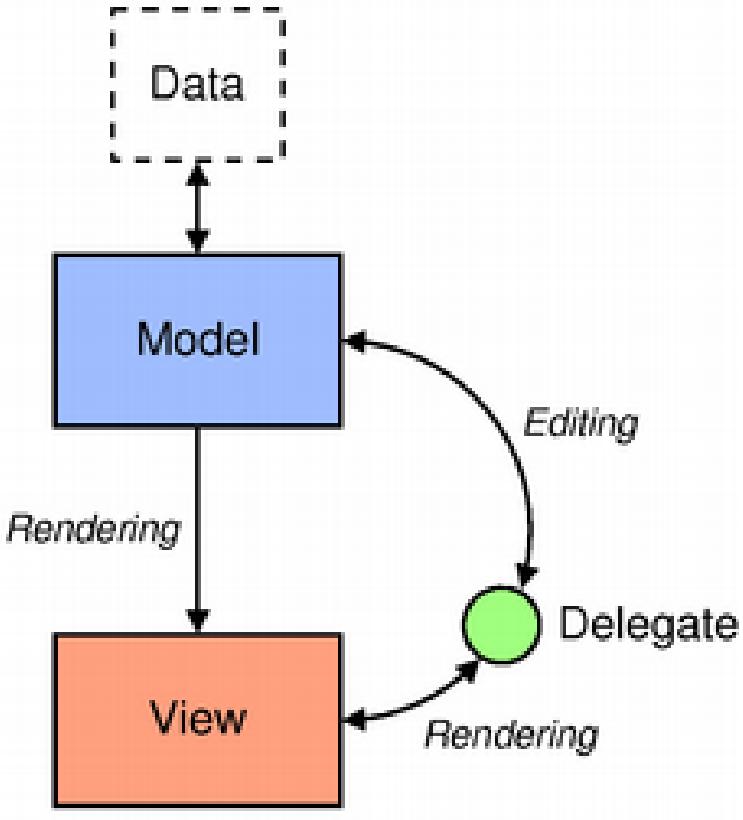

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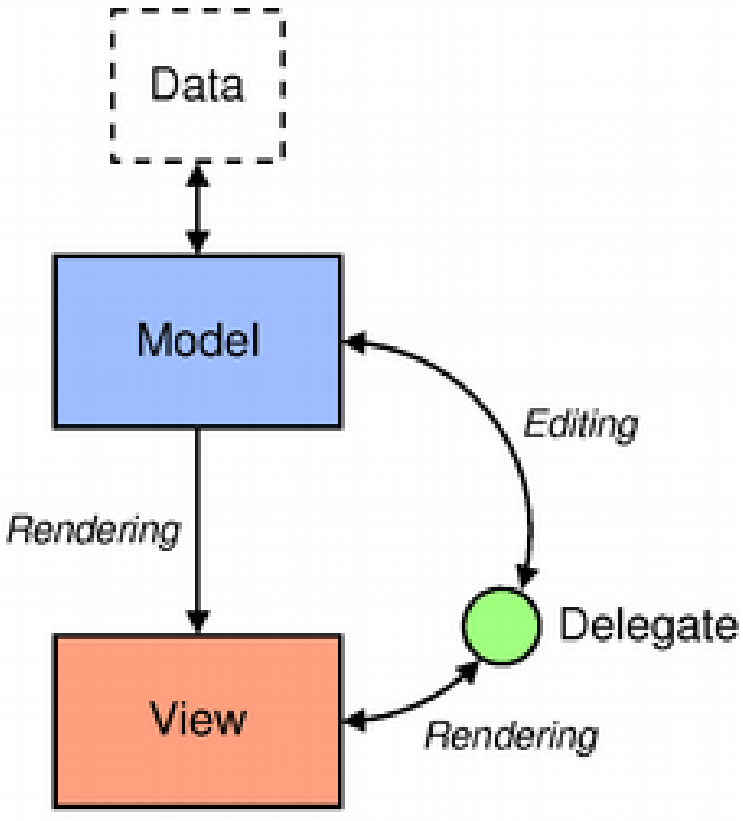

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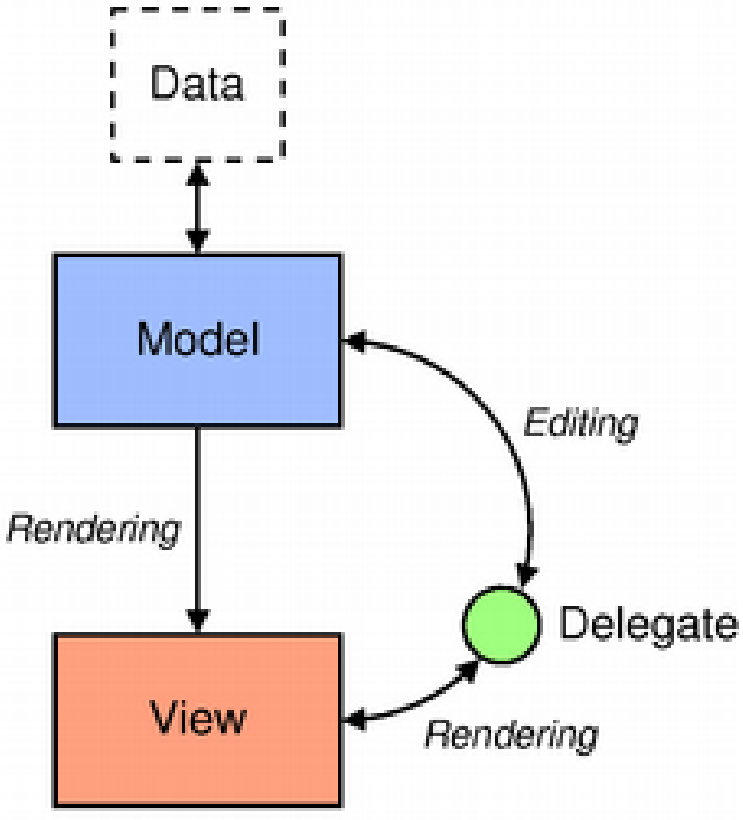

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- **Delegate**: Used to Show/Hide the passwords.

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PassPhrase Generator

- Implemented as a C++/Qt function.
- Works by extracting Random words out of dictionary files (plain text).

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Login and Open a Wallet

Generate and evaluate password

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- In any password manager it is important to suggest random passwords and to check their strength
- All the used libraries in this project are open source, proving it is possible to achieve a high level of security with the use of open software and hardware tools.
- The developed application still lacks some features in order to be considered a truly commercial product.

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Android

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- Port SEcube™ host-side libraries to android
- Port Qt application to android