A Secure Password Wallet based on the SEcube™ framework

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To authenticate, Master password + Device are required

Outline

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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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zxcvbn: Password strength estimator

Dictionaries, keyboard patterns, sequences, years

The SEcube™ Open Security Platform

Hardware

Software

The SEcube™ Open Security Platform

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Developed by the Blu5 Group

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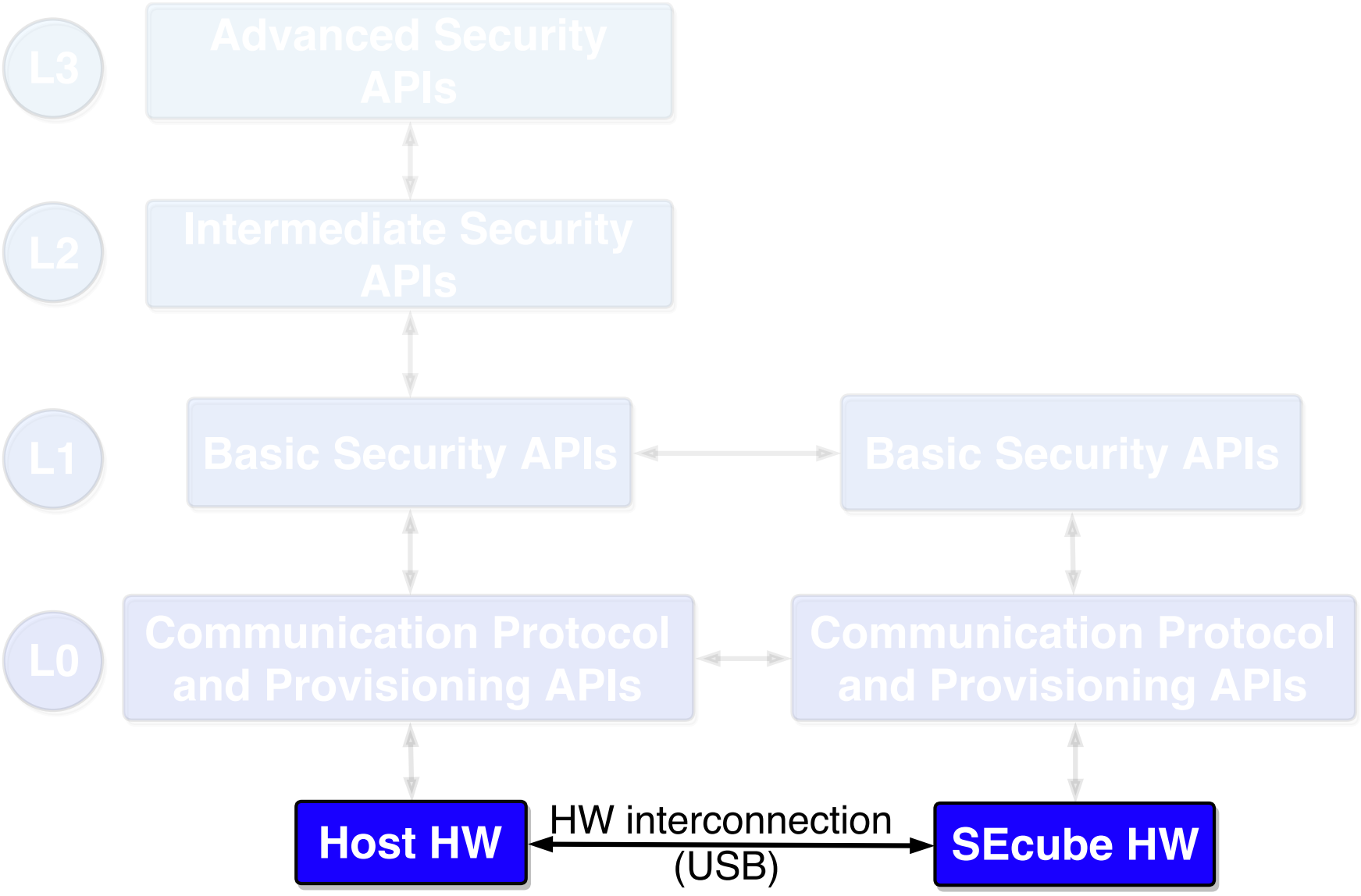
Host libraries: Allow to experience the platform as a high-security black box.

SEcube™ APIs hierarchy



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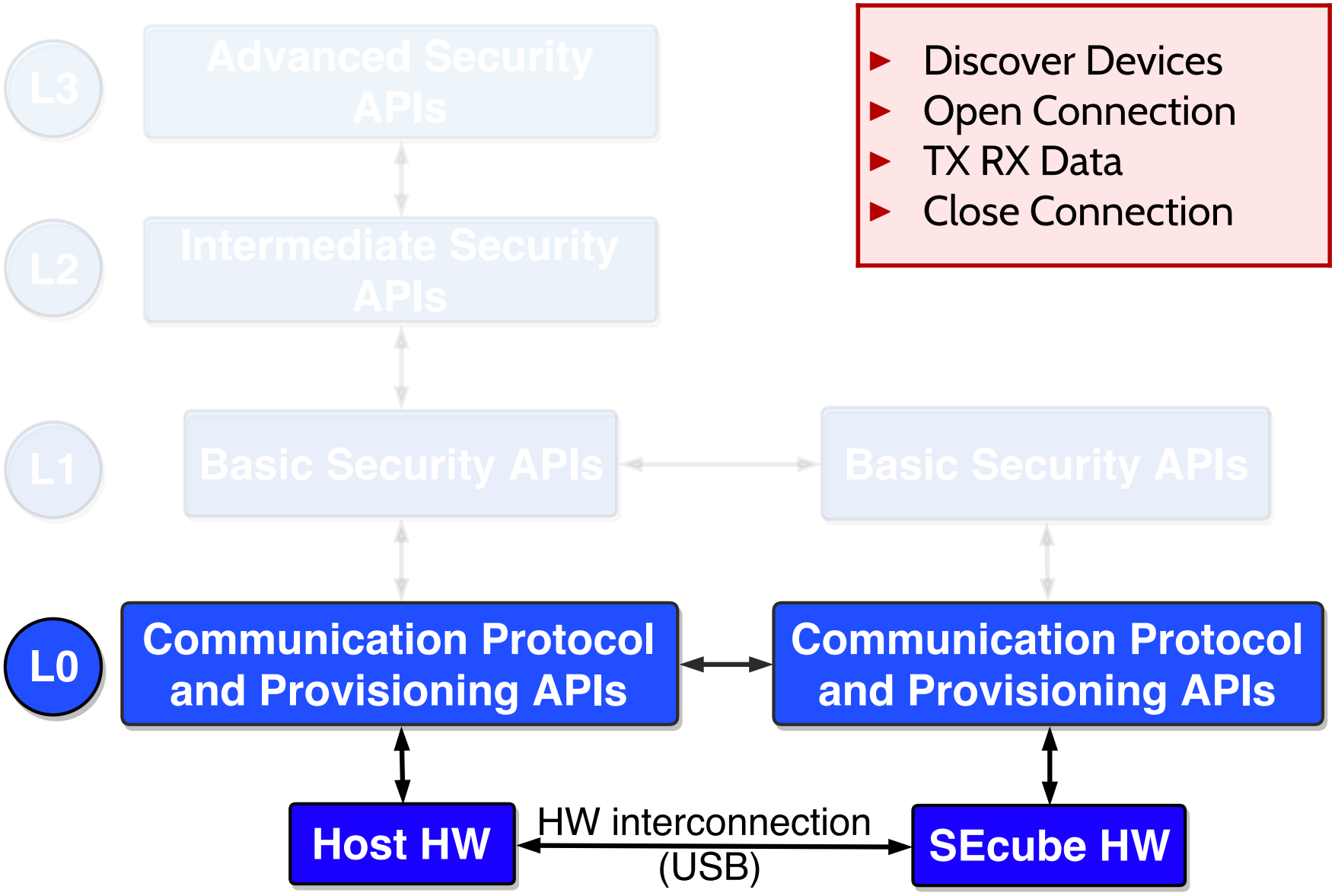
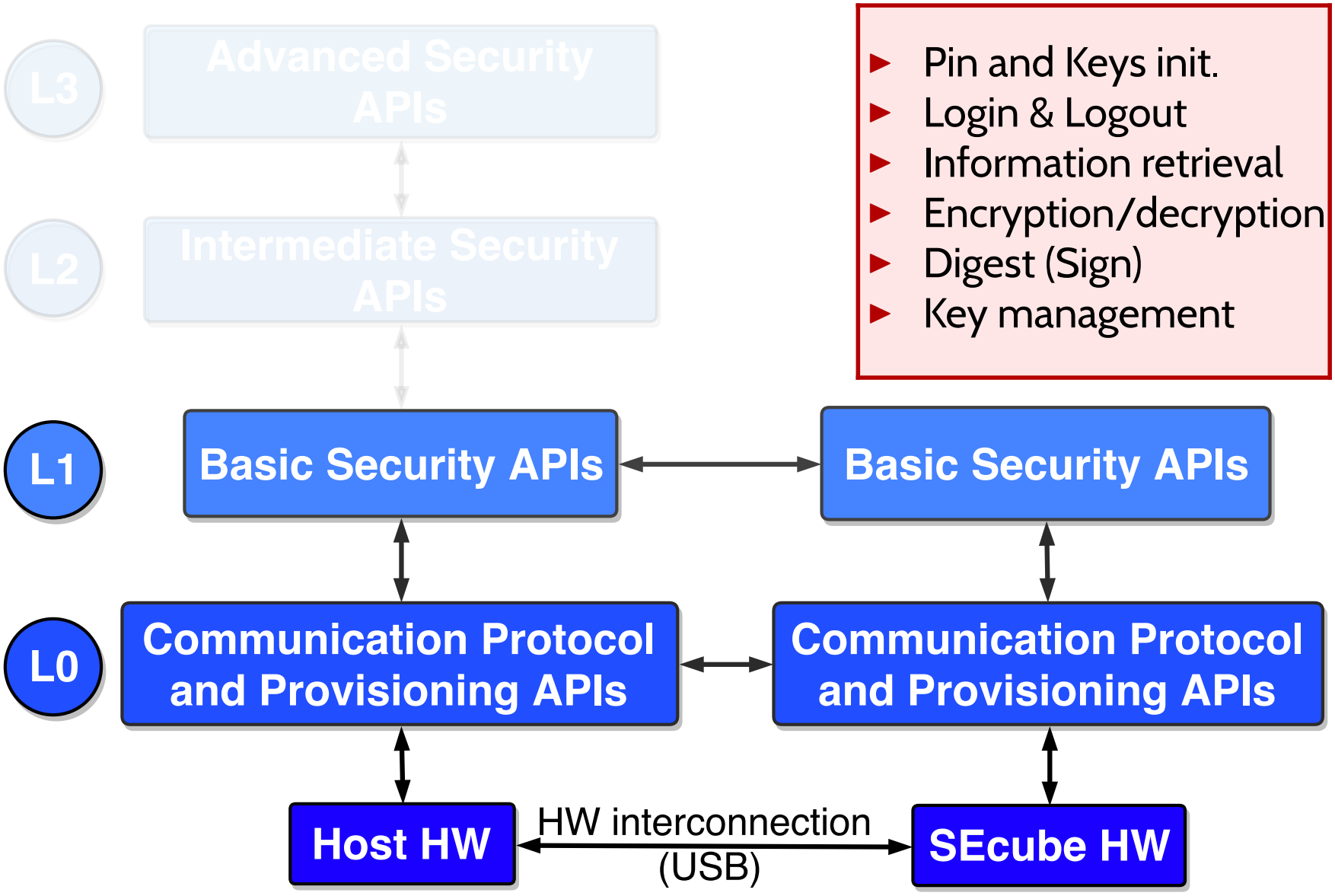


- Discover Devices
- Open Connection
- TX RX Data
- Close Connection

SEcube™ APIs hierarchy



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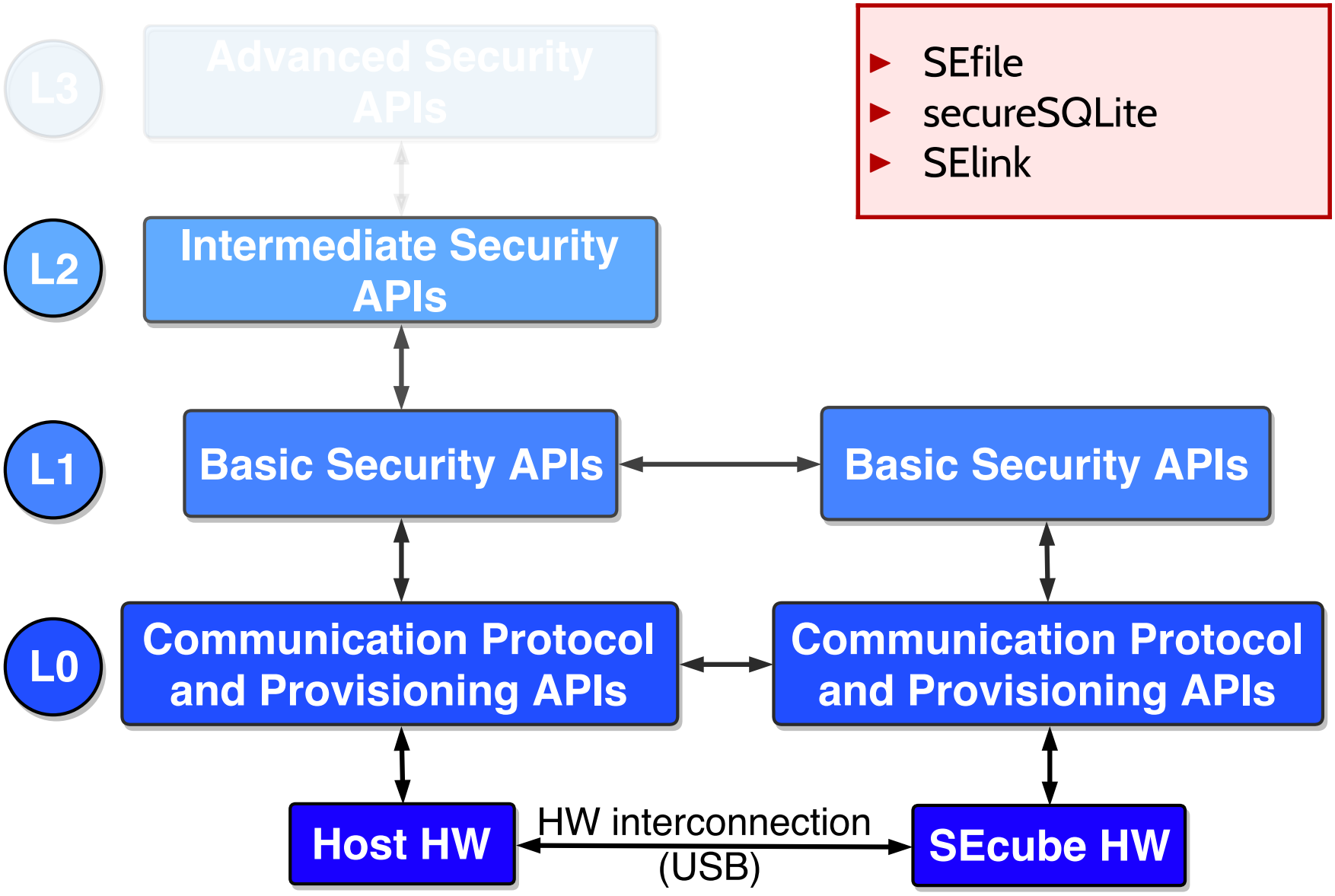

- SEfile
- secureSQLite
- SElink

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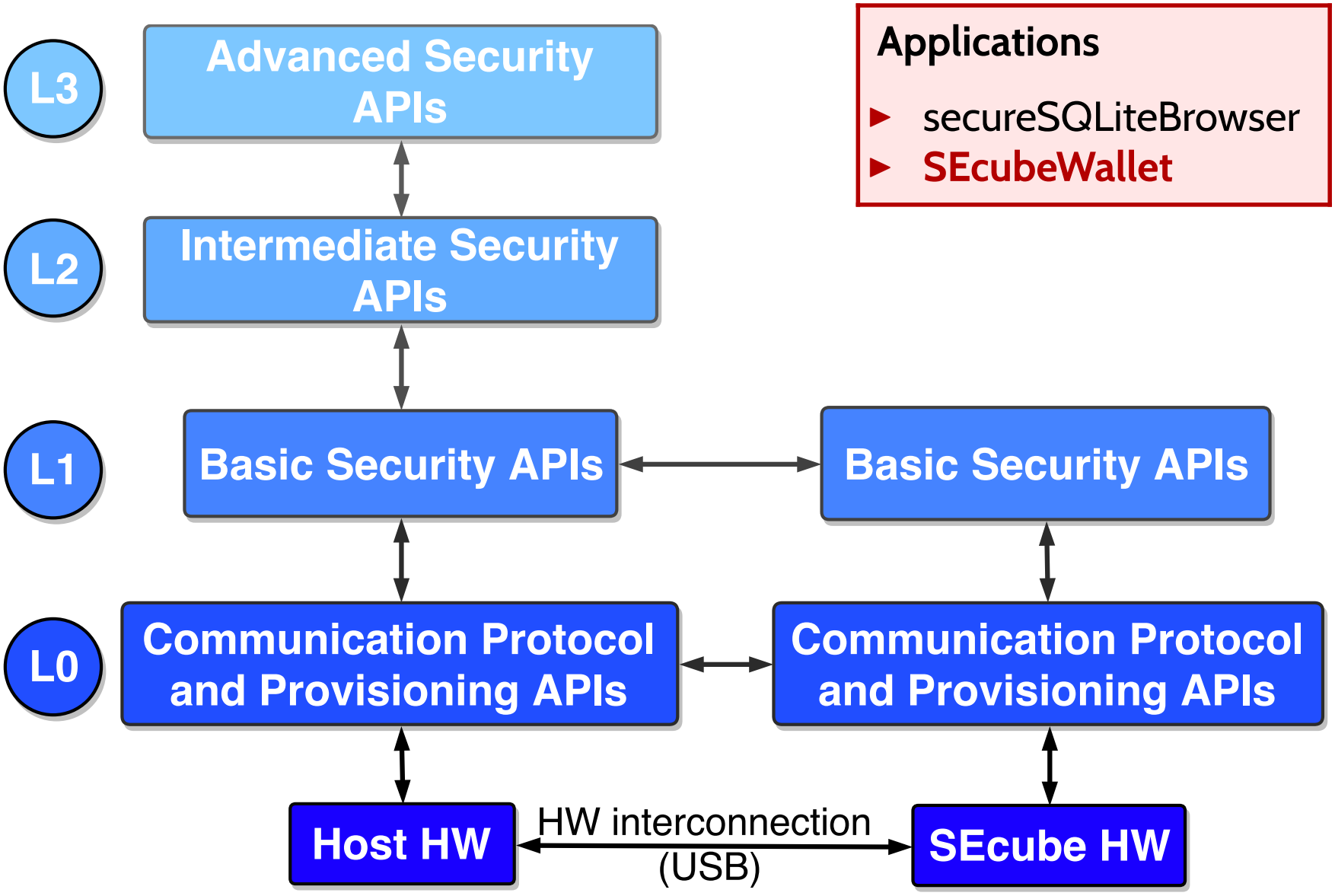
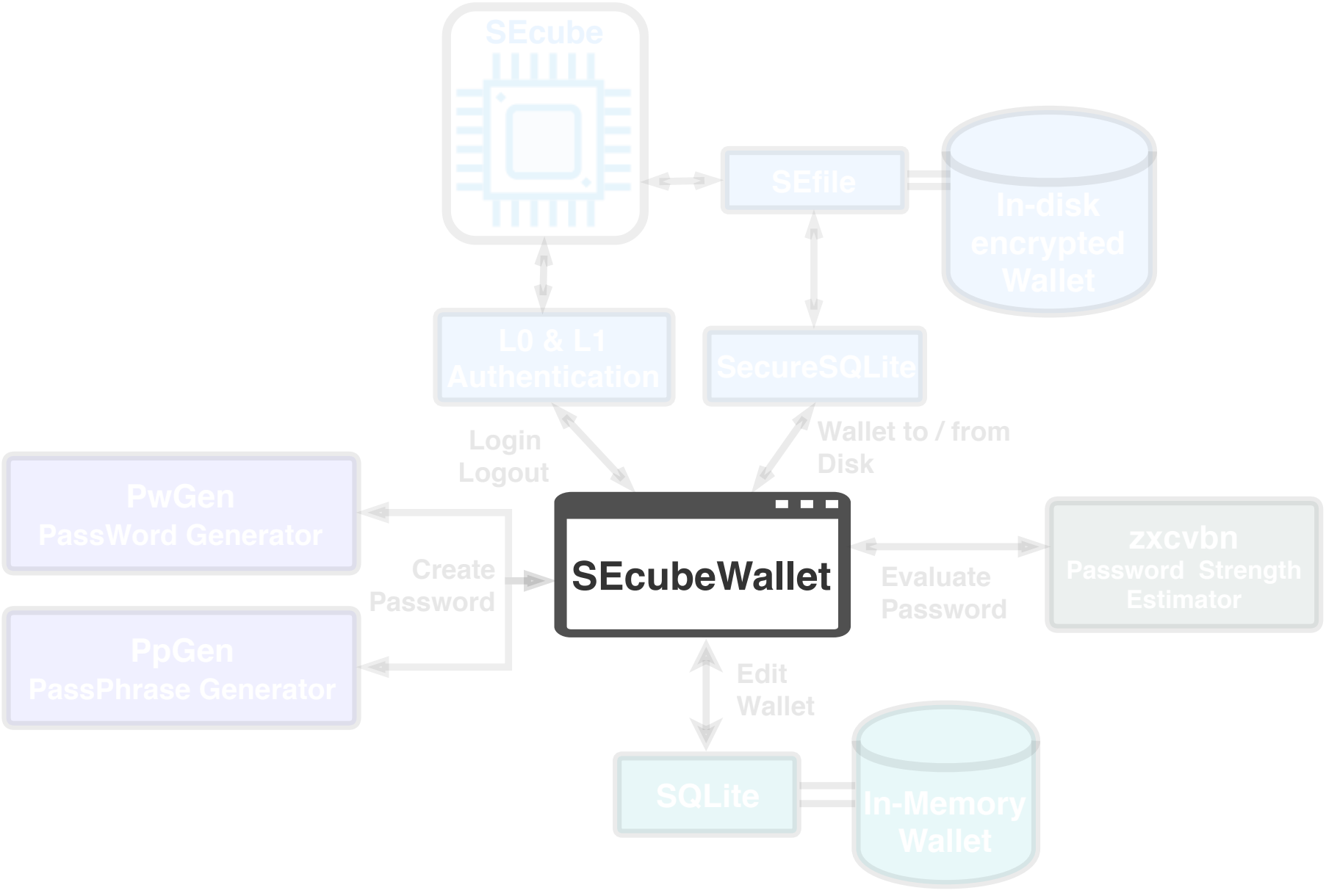
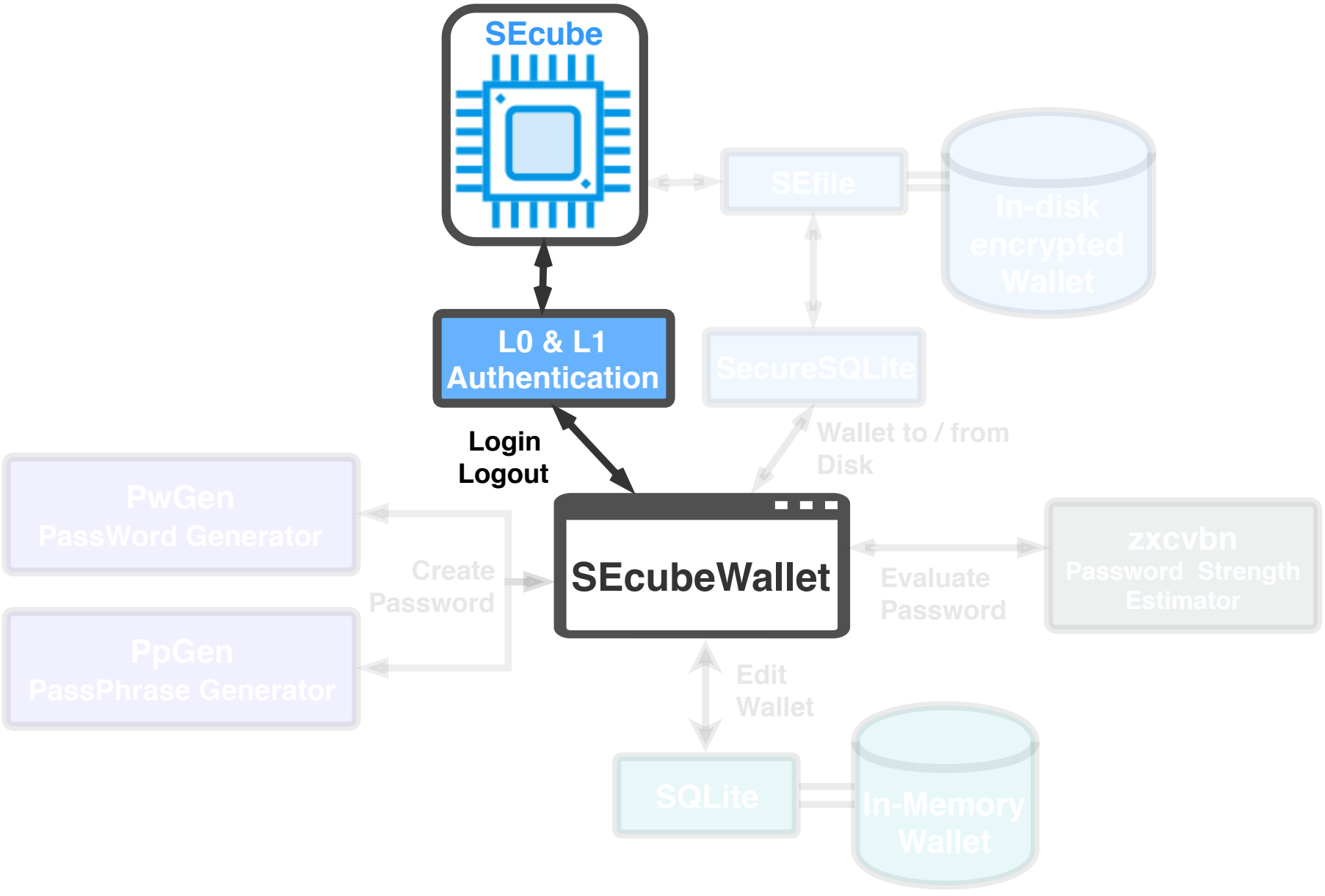


Outline

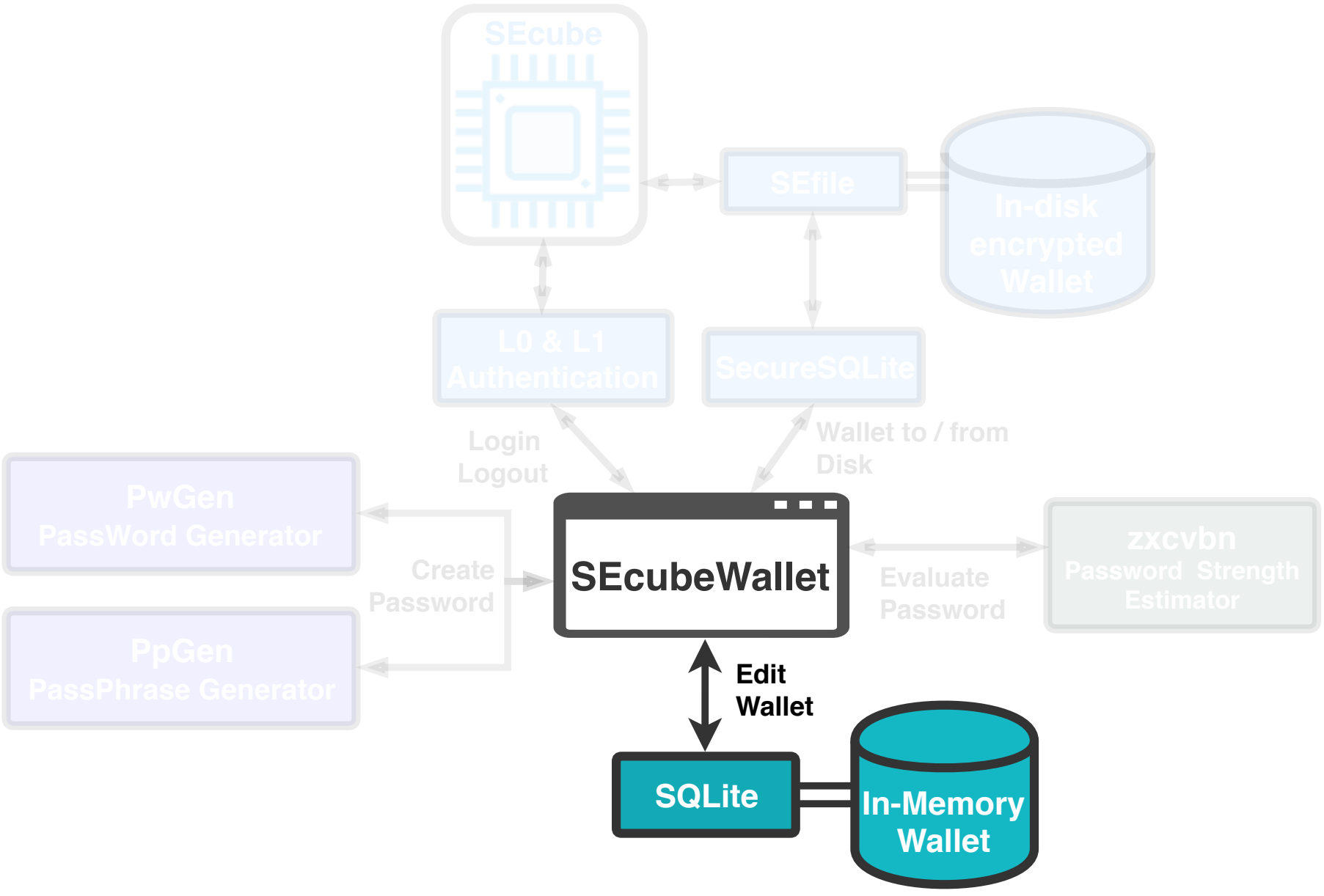
SEcubeWallet Application



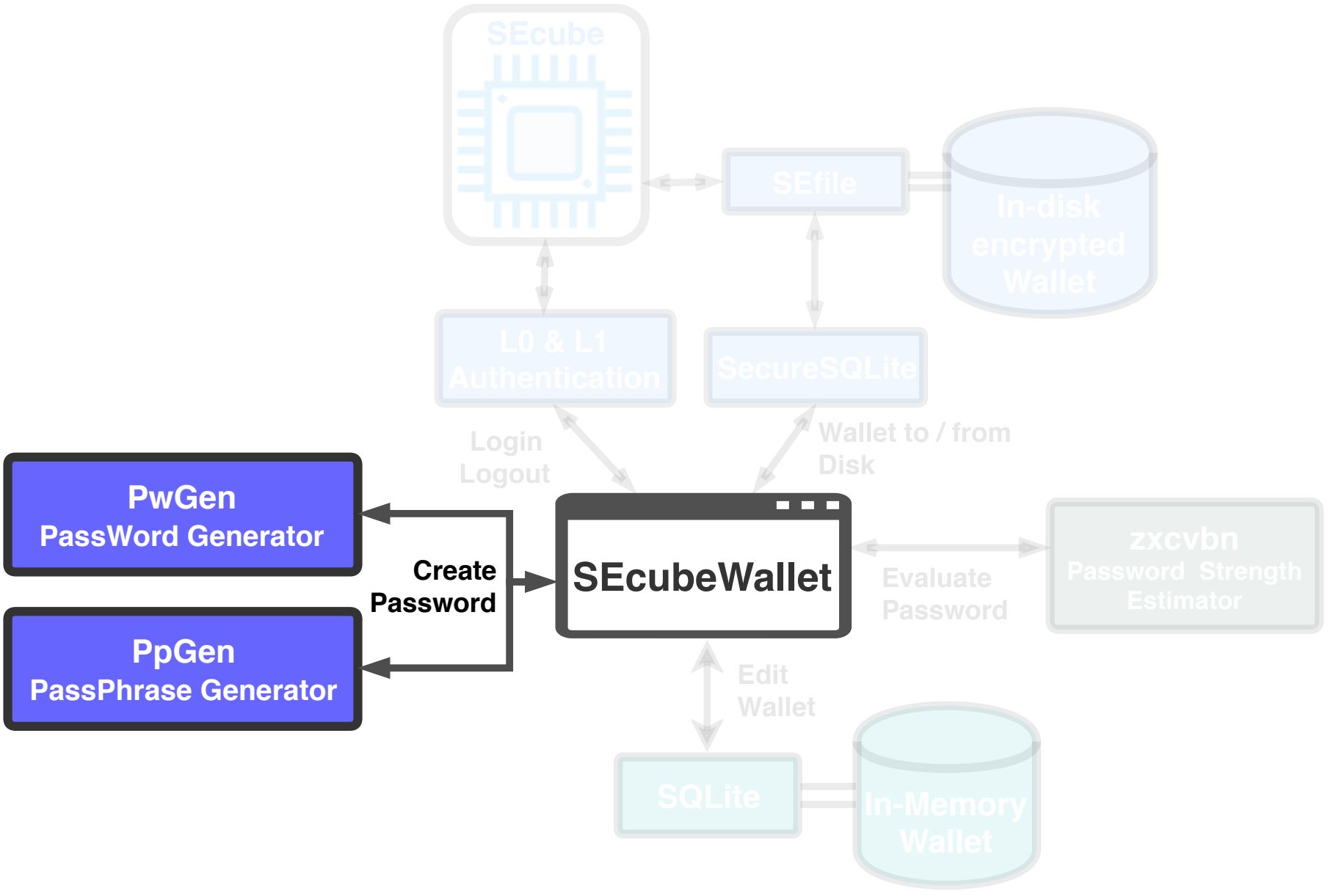
Open device and authenticate



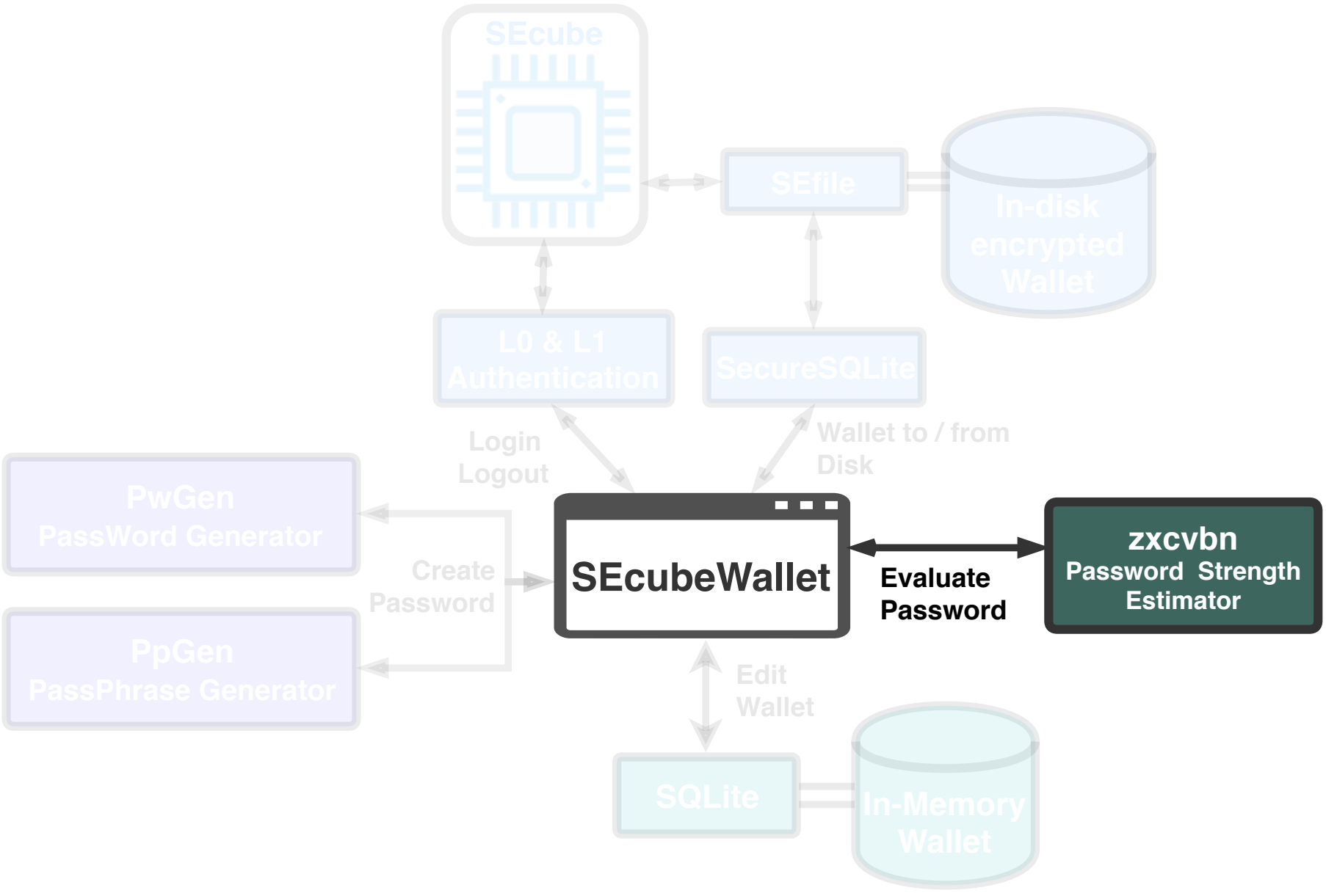
Create In-memory Wallet



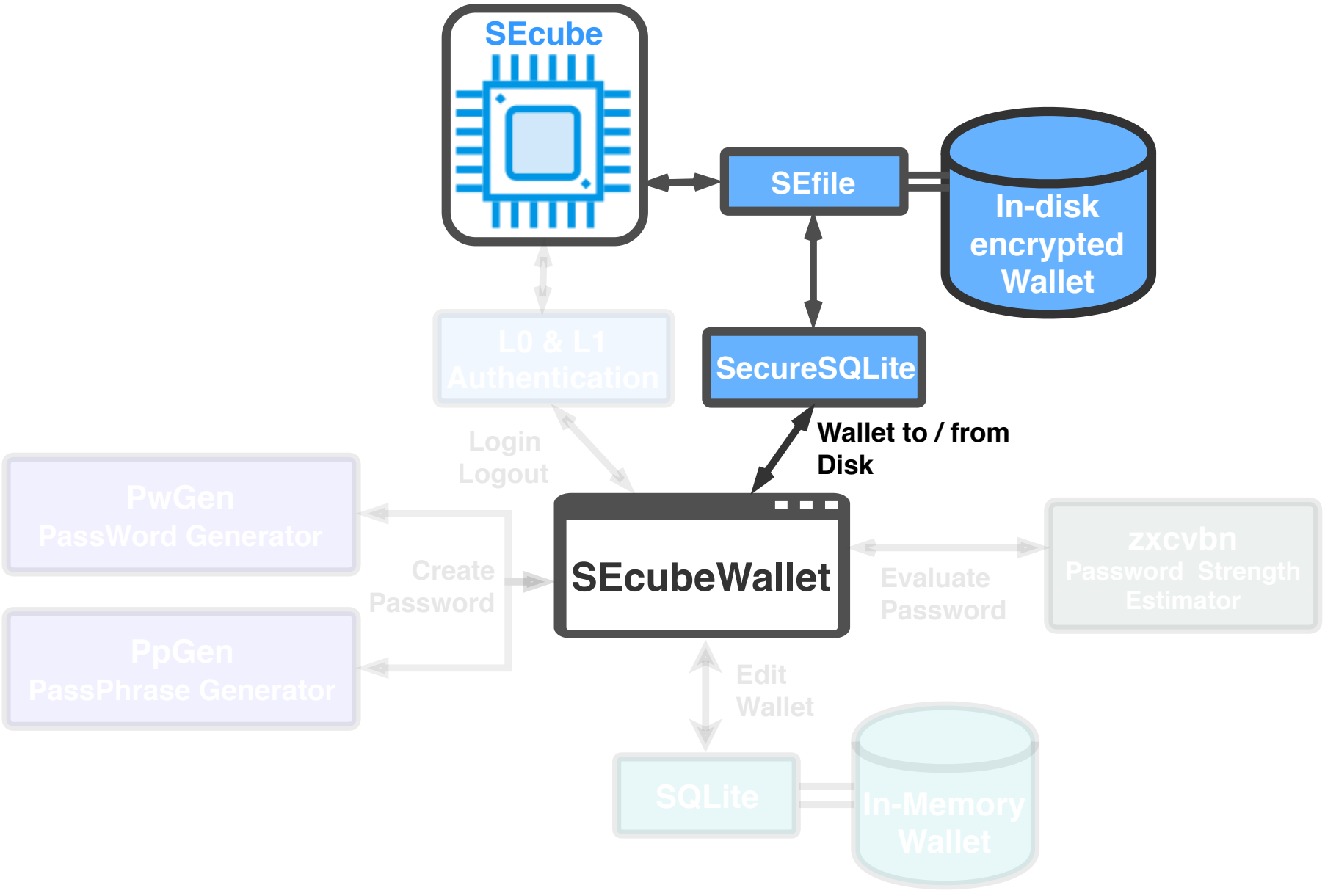
Generate Password/Passphrase



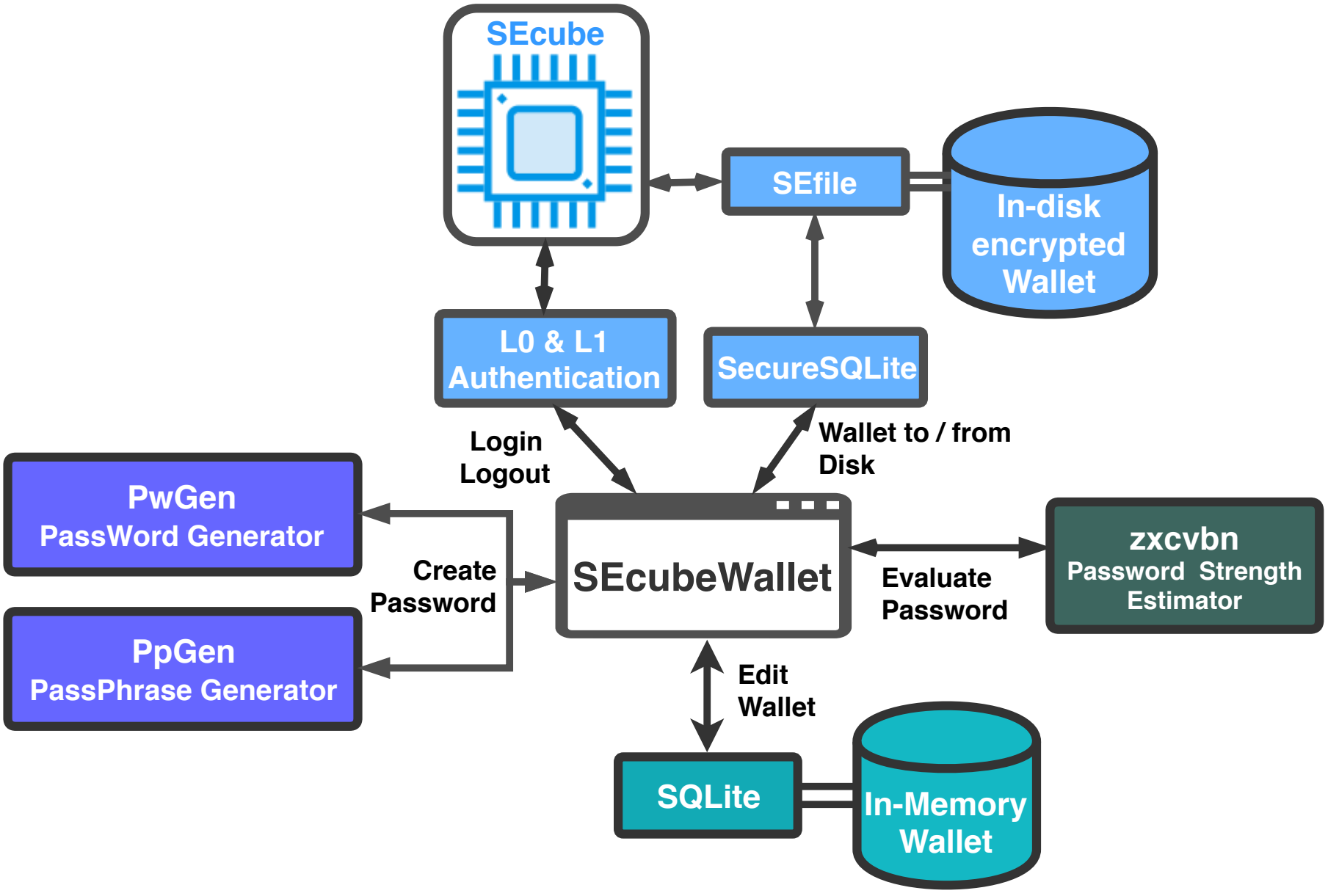
Evaluate Strength



Encrypt and Save Wallet to disk



General Architecture



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The data (passwords) can only be accessed if:

- SEcube™ device is connected
- Login pin is the correct one
- Key inside the device is the correct one.

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- **Delete Wallet:** Both the In-memory DB and the In-disk encrypted file are deleted.

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.
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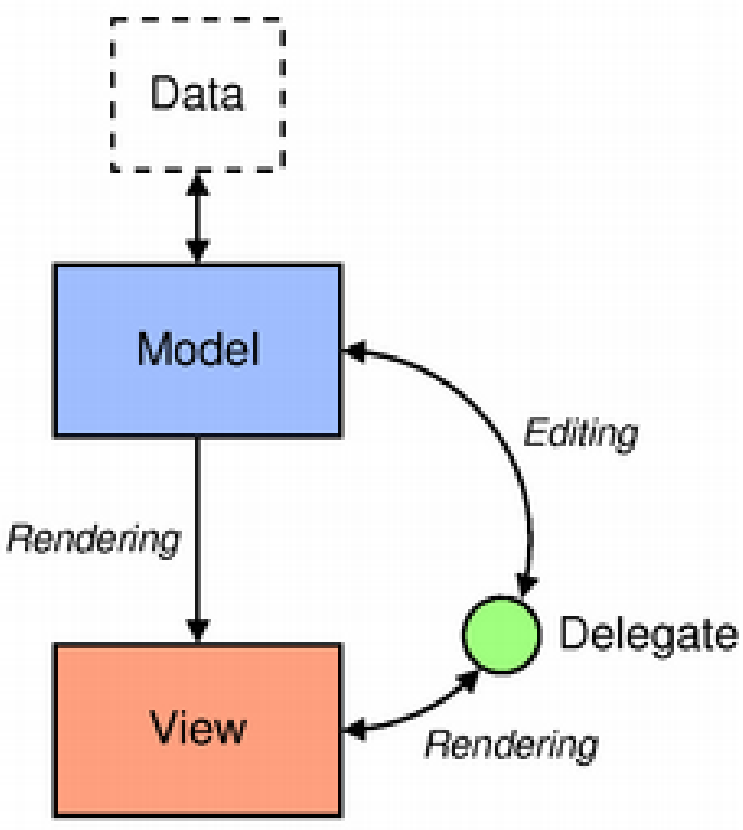

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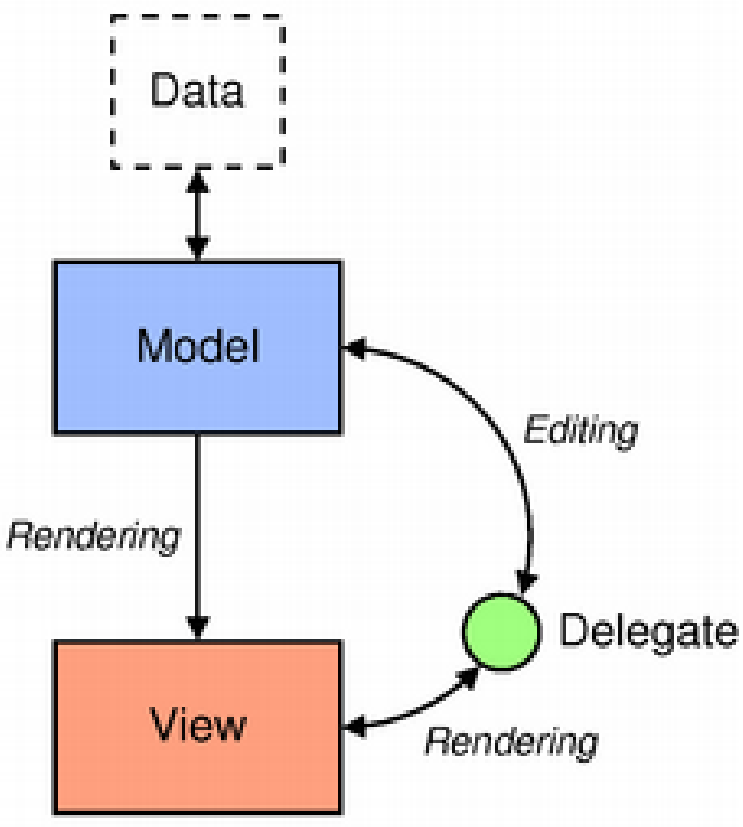

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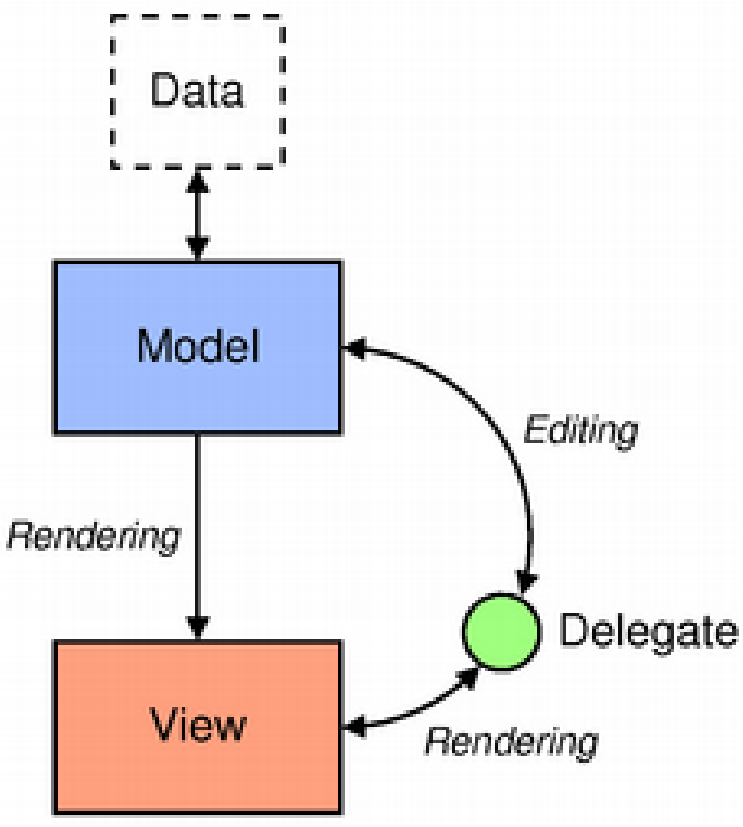

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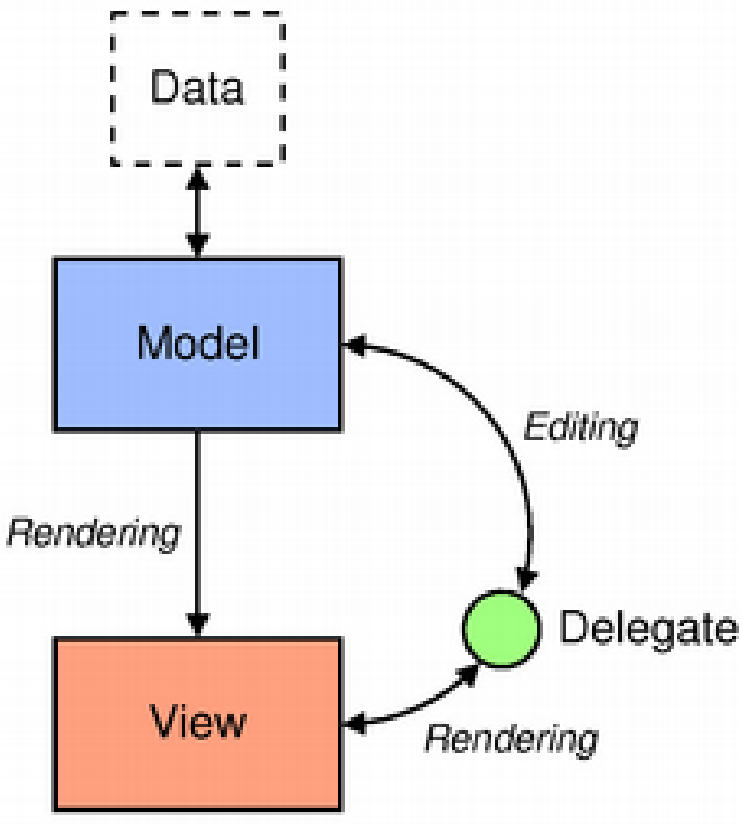

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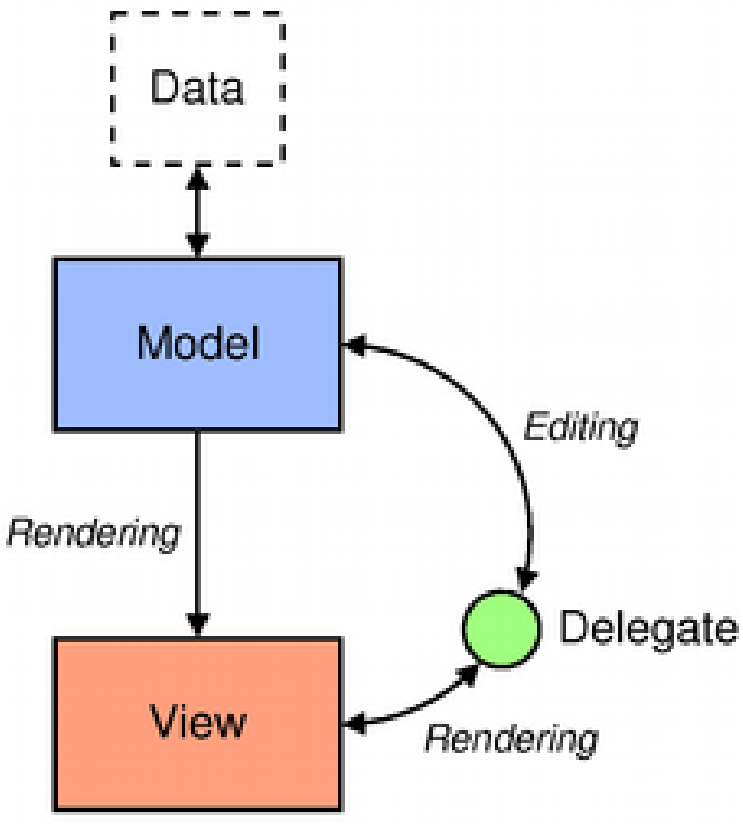

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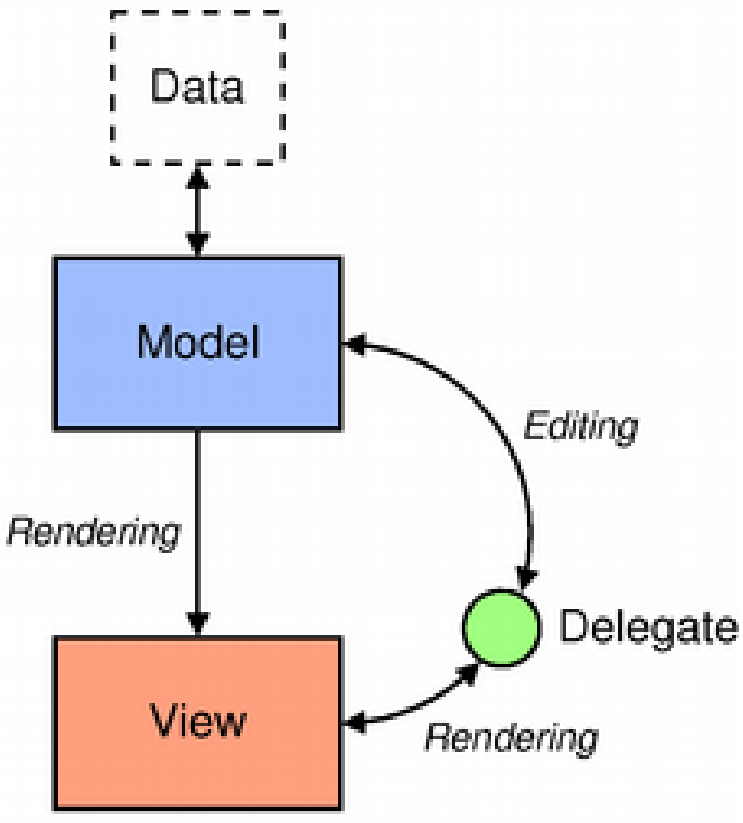

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- **Delegate**: Used to Show/Hide the passwords.

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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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- **l33t converter**
  From PenicuikCiting to 9en1cu1kC1t1ng.

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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
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- The developed application still lacks some features in order to be considered a truly commercial product.

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   - ▶Software libraries
   - ▶The SEcube™ Framework
3. Design and implementation
   - ▶General Architecture
   - ▶Basics of Operation
   - ▶Implementation details
4. Demos
5. Conclusions
6. **Future Work**

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Android

- Use a SEcube™ phone device
- Port SEcube™ host-side libraries to android
- Port Qt application to android