A Secure Password Wallet based on the SEcube™ framework

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Politecnico di Torino

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Motivation

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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
4. Demos
5. Conclusions
6. Future Work

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Software Libraries

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PwGen: Password generator

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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

Hardware

Developed by the Blu5 Group

Software

The SEcube™ Open Security Platform

Hardware

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Family

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

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SEcube™ Chip

- **MCU:** STM32F4 (STM)
- **FPGA:** MachXO2-7000 (Lattice)
- **Smart Card:** SLJ52G (infineon)

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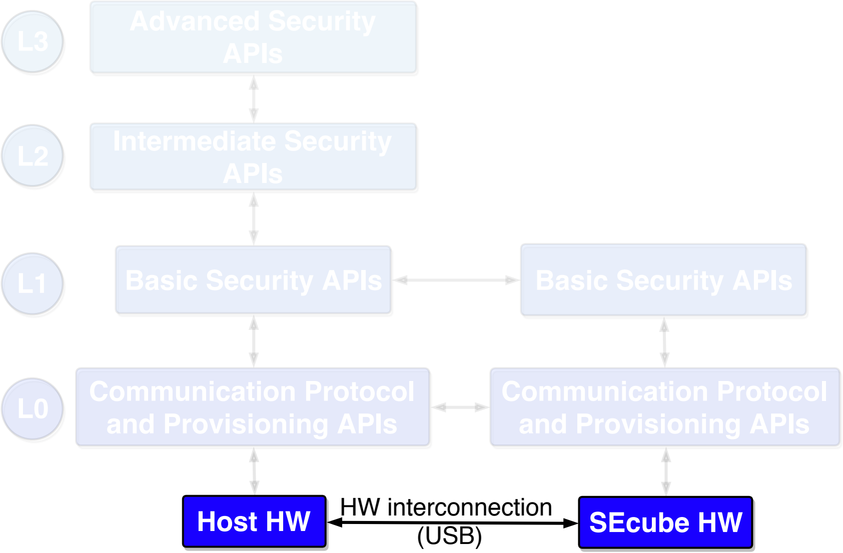
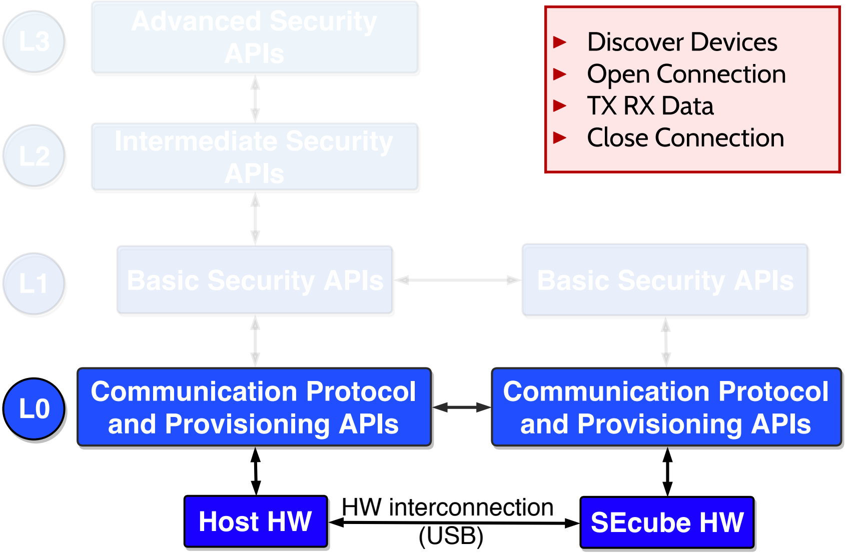
Host libraries: Allow to experience the platform as a high-security black box.

SEcube™ APIs hierarchy


L3
Advanced Security APIs
L2
Intermediate Security APIs
L1
Basic Security APIs
Basic Security APIs
L0
Communication Protocol and Provisioning APIs
Communication Protocol and Provisioning APIs
Host HW
HW interconnection (USB)
SEcube HW

SEcube™ APIs hierarchy



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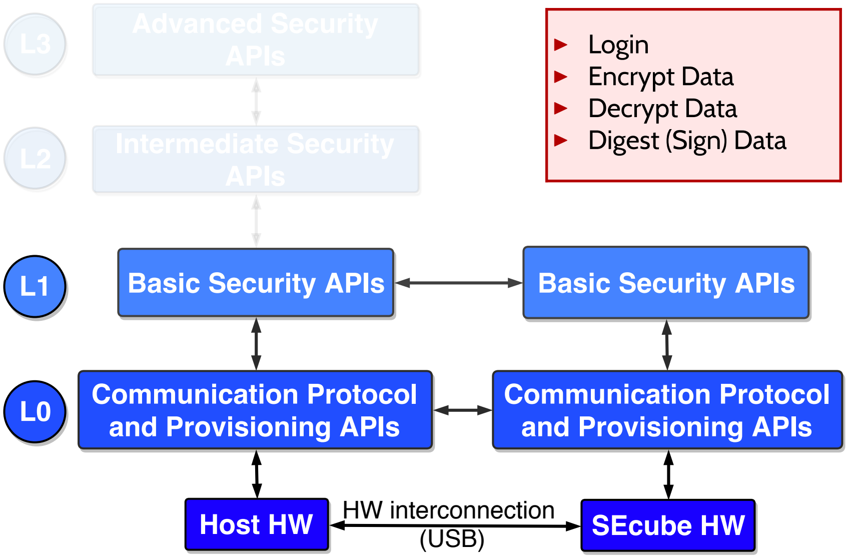
- Discover Devices
- Open Connection
- TX RX Data
- Close Connection

SEcube™ APIs hierarchy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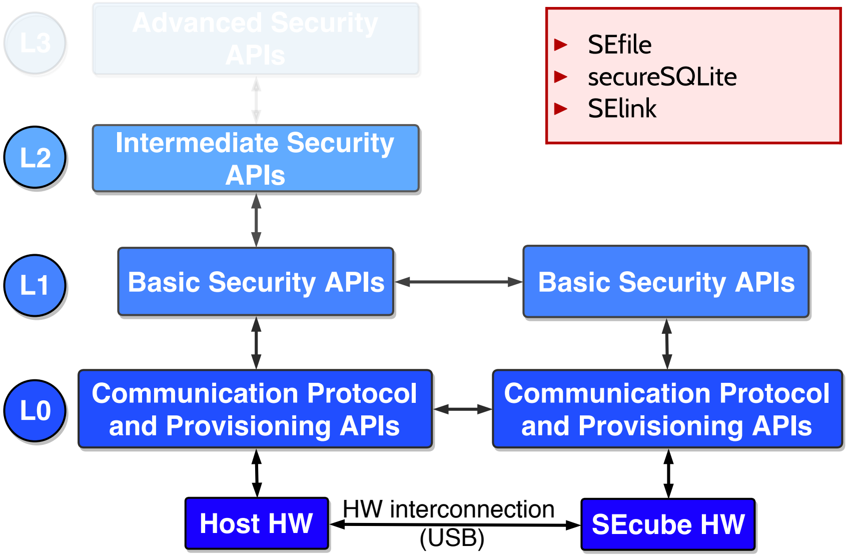
- Login
- Encrypt Data
- Decrypt Data
- Digest (Sign) Data

SEcube™ APIs hierarchy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- SEfile
- secureSQLite
- SElink

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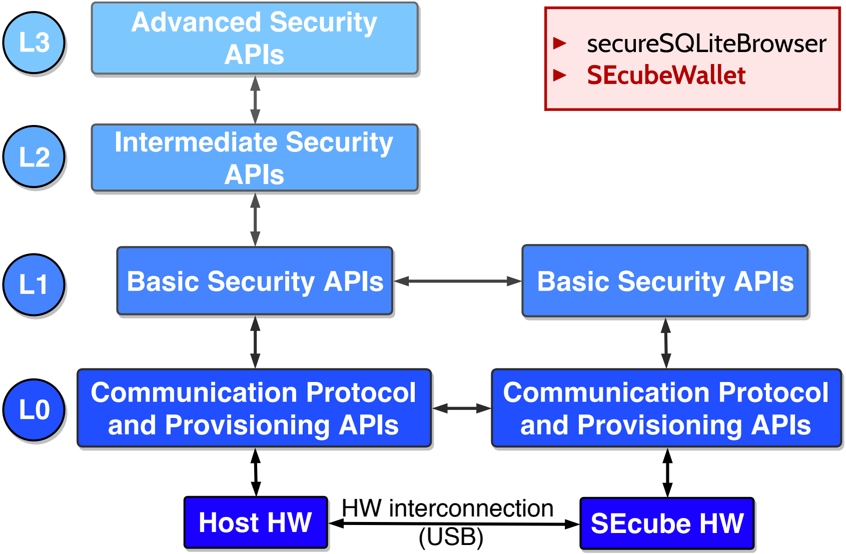
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- secureSQLiteBrowser
- **SEcubeWallet**

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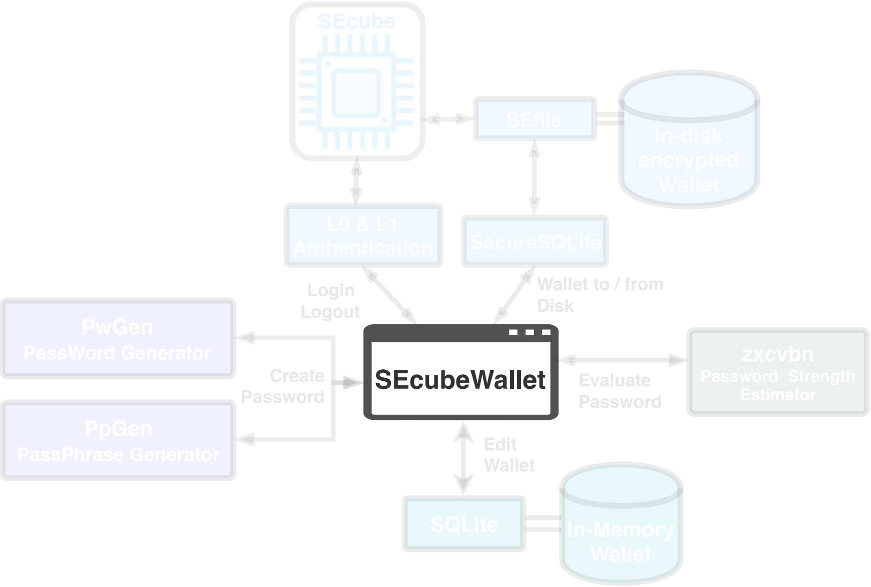
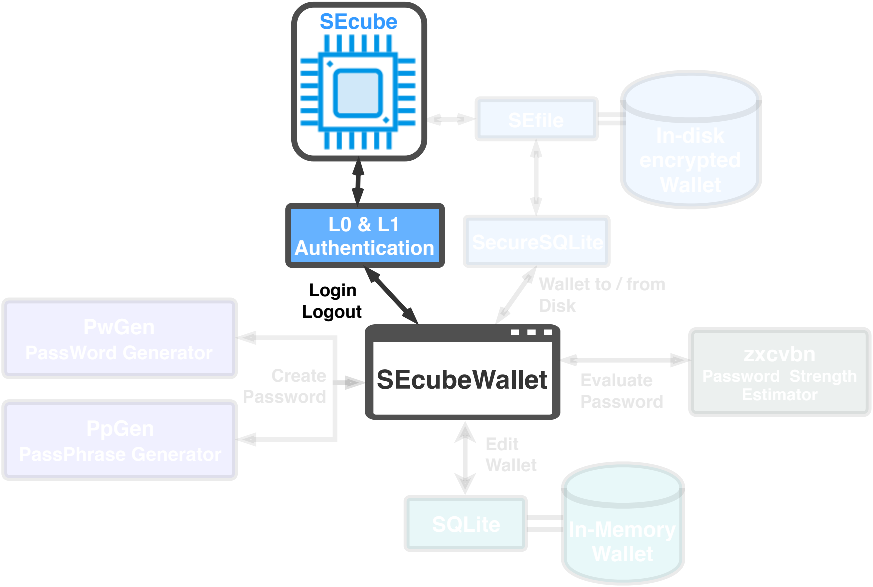
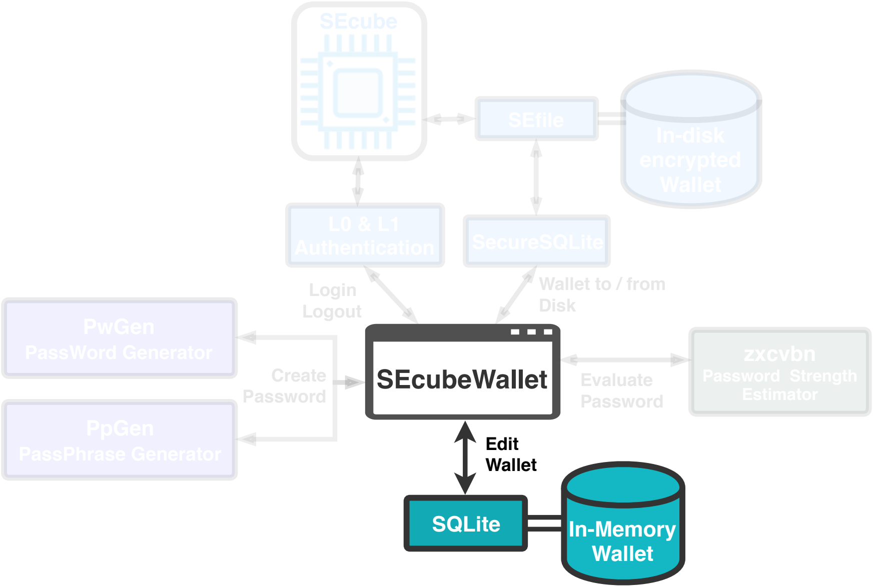
SEcubeWallet Application



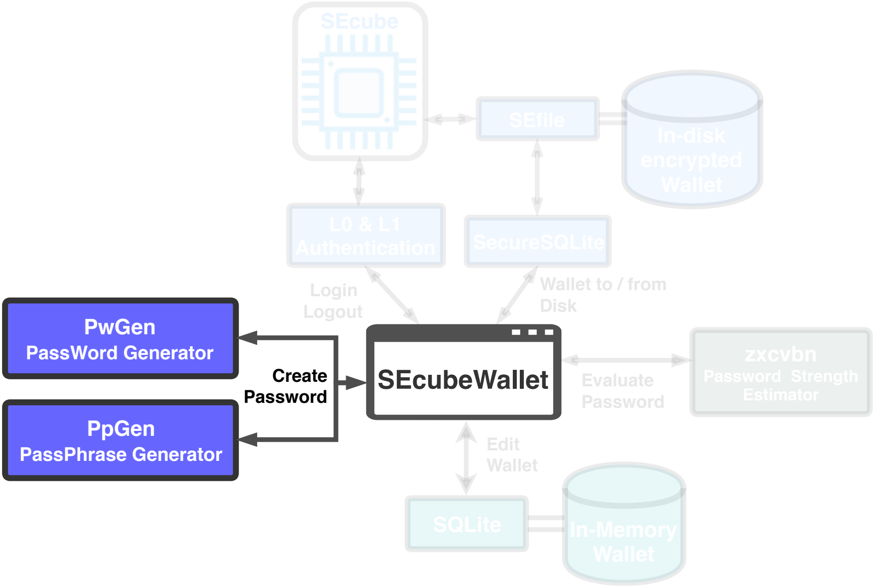
Open device and authenticate



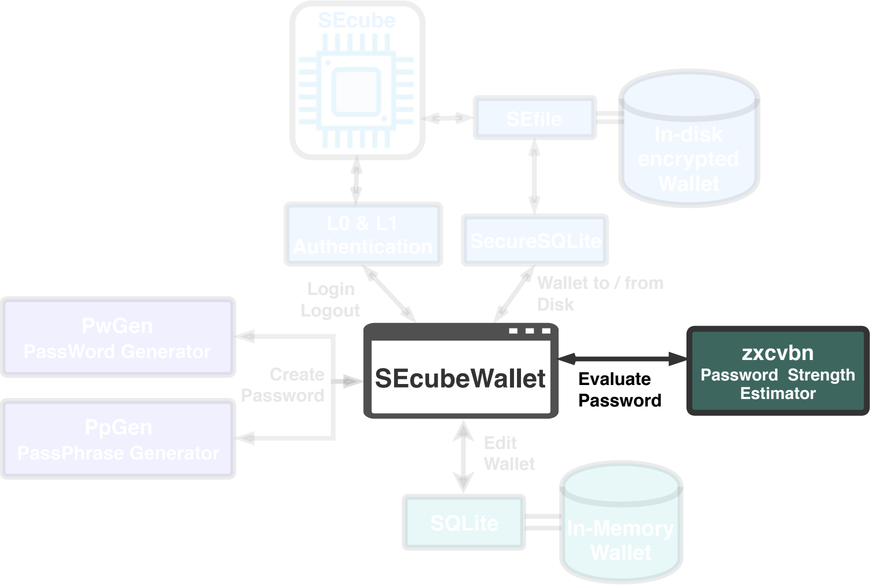
Create In-memory Wallet



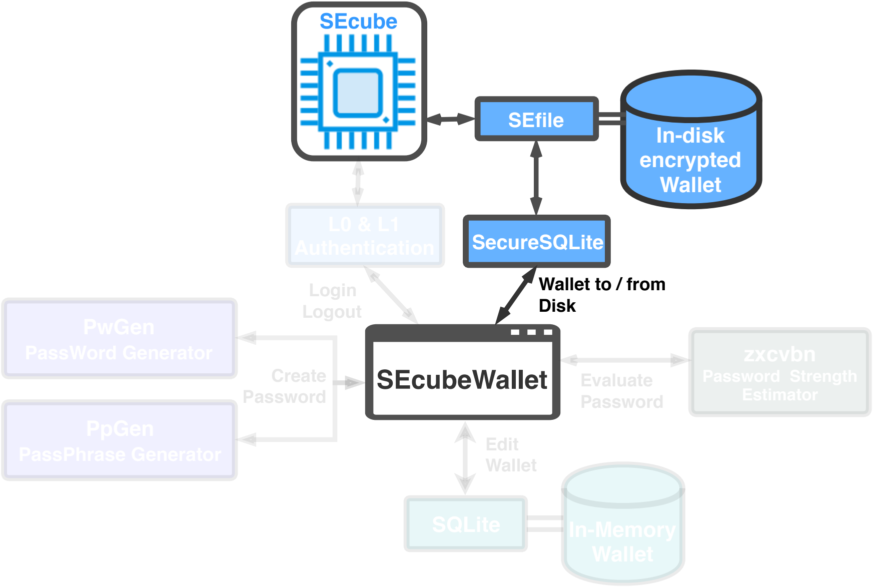
Generate Password/Passphrase



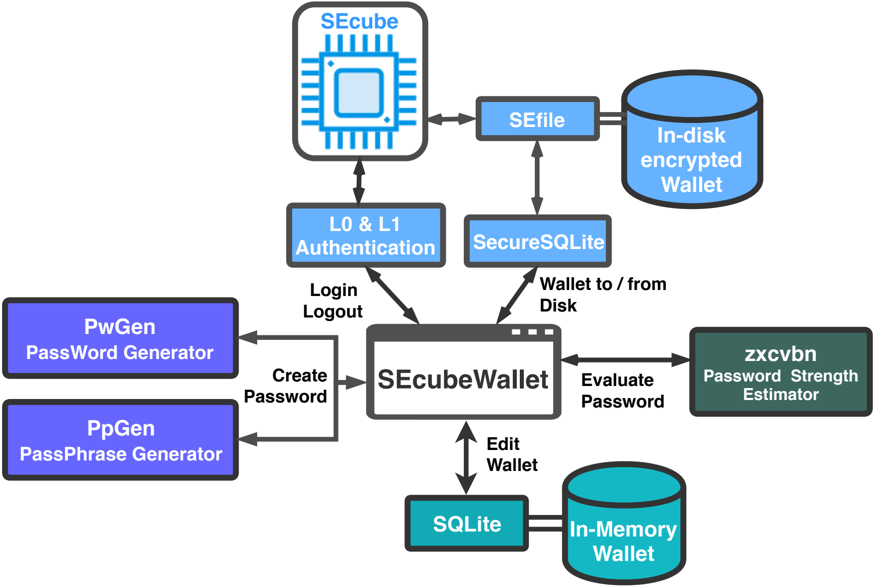
Evaluate Strength



Encrypt and Save Wallet to disk



General Architecture



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Login and Open a Wallet

Generate and evaluate password

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