secret•in

A team-oriented open source password manager with a focus on transparency, usability and security.

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SCRT

Who am I ?

Florian Gaultier

Security engineer in charge of SCRT France

I break things for a living, find vulnerabilities in software built by others

I’m also a CTF player with **0daysober** team
3rd place DEFCON (Las Vegas), 2nd Codegate (Seoul)

I organize **Sthack** with friends in Bordeaux !

SCRT
Information Security

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SIDE PROJECT

Why this name ?

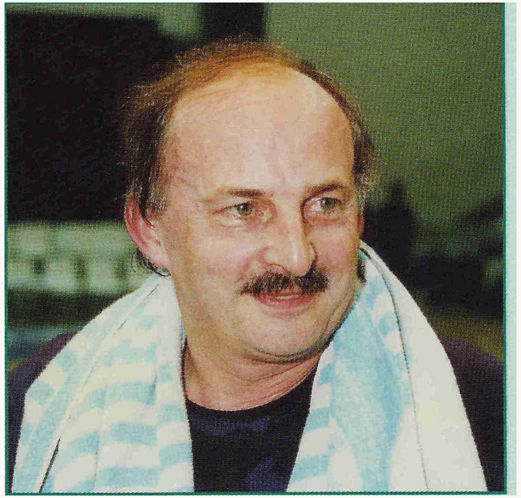
I won a *.me domain name thanks to 15th Gandi’s anniversary

Thought about the joke **secret-in.me**

Needed something to host on it

Decided to develop a password manager

(I also own https://so.much.beer, you’re welcome)



What’s a password manager ?

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WHAT’S A PASSWORD MANAGER ?

Why do we need a password manager ?

A password is the **lock** on your door
Keep your private data… private

Must have one password by field to prevent one **compromised** website to give your only password to the world

Besides, the more a password travels, the more you should change it (increased compromission probability)

Impossible to **remember** hundreds of changing passwords

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Database*less* password manager

Use a pure algorithm which basically computes a password from ("website"|"secret").

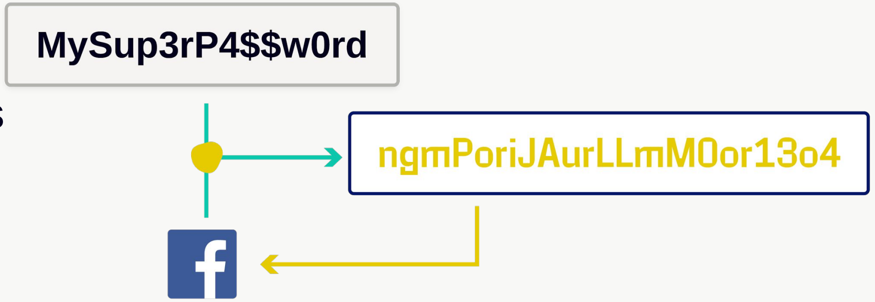
PROS

You don't need any storage nor synchronisation process

CONS

You can't easily change a password

You can't comply with weird password policies



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Password manager with database

Generate one password by field and store it physically in a **notebook**

PROS

Need physical access to steal passwords
Easy to use
Nothing to memorize

CONS

You need to keep it with you
Hard to **backup**, hard to update
Copy/paste doesn't exist in physical world

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WHAT'S A PASSWORD MANAGER ?

Password manager with digital database

PROS

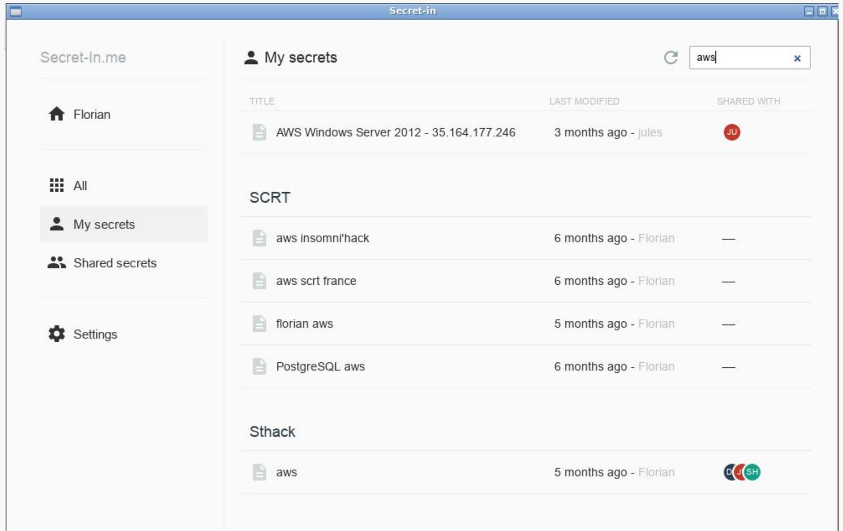
Use algorithms and computers to store your passwords

One secret **master password** to lock all the others in a safe encrypted database

CONS

Trust in software and technologies

Your master password is the **SPOF** (Single Point Of Failure)



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Secret-In.me

Florian

All

My secrets

Shared secrets

Settings

My secrets

aws

TITLE	LAST MODIFIED	SHARED WITH
AWS Windows Server 2012 - 35.164.177.246	3 months ago - jules	JU

SCRT

TITLE	LAST MODIFIED	SHARED WITH
aws insomni'hack	6 months ago - Florian	—
aws scrt france	6 months ago - Florian	—
florian aws	5 months ago - Florian	—
PostgreSQL aws	6 months ago - Florian	—

Sthack

TITLE	LAST MODIFIED	SHARED WITH
aws	5 months ago - Florian	SH

Password managers : State of the art

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STATE OF THE ART

Proprietary software

Example : Lastpass, 1Password, Dashlane…

PROS

A lot of features

Multiple devices support

Enterprise **support**

CONS

Vendor-lockin

Blindly trust the **vendor**

Costs money (what happens if they raise their prices)

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WHY ANOTHER PASSWORD MANAGER ?

Open source software

Example : Keepass, passbolt...

PROS

Auditable by anybody

No vendor-lockin, **free** like free speech

Self-hosting

CONS

No great support

Not so great UX-UI

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WHY ANOTHER PASSWORD MANAGER ?

Life of a pentester

No clear path for companies.

Keepass not designed to be shareable is used with weird SMB synchronisation mechanisms

Open source or private weird solution with **LDAP** binding !

LDAP binding (or SSO) is like using the **same password everywhere**...

Yes but secret-in

YES BUT SECRET-IN

Development goals

No **heavy software**

> Upgrade mechanisms, executable to trust…

Never roll your **own Crypto**

> Writing crypto is hard, like really hard !

Built for **companies**

> Open source may scare companies

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YES BUT SECRET-IN

No heavy software

One thing you have on almost any device : **Browser**

Secret-in core only uses **JavaScript**

“Wait, what ? You wrote crypto in JavaScript ?!”

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YES BUT SECRET-IN

Never roll your own Crypto

W3C produced WebCryptoAPI spec (out of draft in february 2017)

Contains **standard cryptographic** algorithms (hash, asymmetric, symmetric)

Built in **browser engine** so it’s not JavaScript

“You trust Google/Apple/Microsoft engineers don’t you ?”

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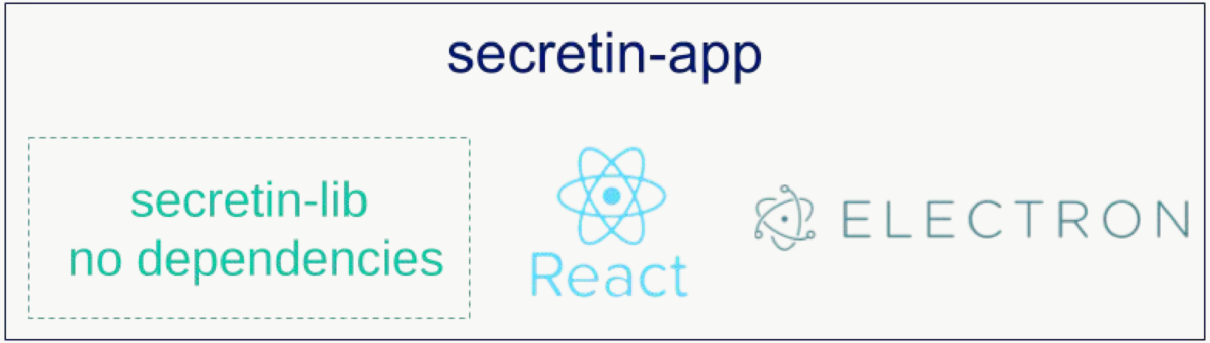
YES BUT SECRET-IN

Built for companies

Trust and transparency

WebApp code splitted between **simple core lib** and UI-UX wrapping

Core lib contains the logic and can be “easily” audited.



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YES BUT SECRET-IN

Built for companies

Sharing capabilities

Read, Read/Write, Read/Write/ReShare

Traceability

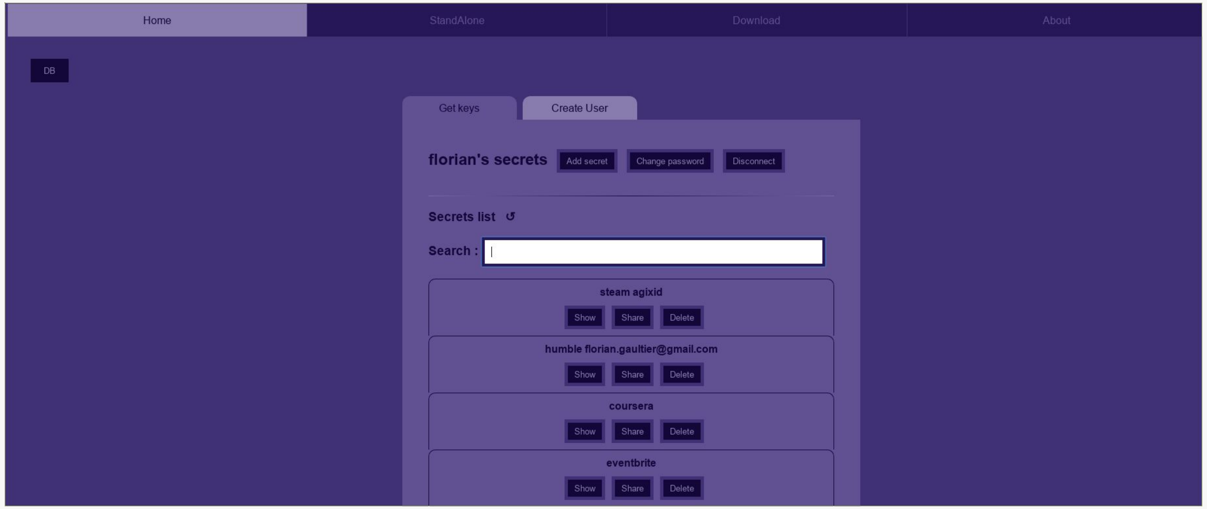
Who, When, What

Documentation

Self-hosting made easy

Good UI-UX

UX engineers are now part of the project



Password manager : step by step

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STEP BY STEP

Offline mode

Everything **client side**

Malicious access to the database must not compromise anything, not even metadata (not even username)

No logic layer, only use crypto to achieve good **confidentiality**

RESULT

Classic password manager features plus sharing capability with big blob of JSON to copy paste as your encrypted database.

```
{"secrets": {
        "0839fb4655ea32255f60e4e37fe07e207be65774d8a9255bc9344403faeaead7": {
            "iv": "2e16d955f86c6589d821c7a1",
            "secret": "873c828e20ef4909cf[...]5640ac4b"}},
    "users": {
        "0a041b9462caa4a31bac3567e0b6e6fd9100787db2ab433d96f6d178cabfce90":
{"keys": {

"0839fb4655ea32255f60e4e37fe07e207be65774d8a9255bc9344403faeaead7": {
                "key": "98fef3afc43e7f3d[...]26b2f833b972b3d54"}},
            "pass": {"iterations": 100024,
                "salt":
"5dd0c60727bc84e49f0fa271bb4e7188d750e10eb0ae868df008d39464541634"},
            "privateKey": {"iv": "23ddc5828a2533c1b23ca5ffa7eb4cb0",
                "privateKey": "6fa526a3c515068537a8e033[...]8e9d8937c21db55b"},
            "publicKey": {
                "n": "yON4sq1SWK9bKEqXWMkG7q[...]drK24TkxJXHJ1yxLDijlM"}}}}
```

STEP BY STEP

Synchronisation

Introduce a **server** to store the encrypted database

Server can’t compromise confidentiality, nor can the network

Server can introduce a logic layer :

- Authenticate to give encrypted database to legit users.
- Add **granularity** in sharing process (Read only, read/write, read/write/reShare)

RESULT

Synchronisation with authentication

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STEP BY STEP

More protections

Server means anonymous access attempt

Add bruteforce detection (by IP address)

Add 2 Factor Authentication (with Google Authenticator)

RESULT

Encrypted database is well protected

STEP BY STEP

More usability

Type your long master password plus 2FA is annoying

Introduce trustable device feature

Shortpass plus trusted device unlock your key

RESULT

Fast login with good security

STEP BY STEP

The return of the offline mode

A desktop application adds offline synchronisation feature

Based on Electron to wrap secretin-app (reused codebase)

Saves a local database backup to access it offline

RESULT

Cross platform application with offline synchronisation

DEMO

Password manager : technical ~~boring~~ stuff

How does it work ?

Cryptographic level guarantees **confidentiality**

- Classic **RSA** 4096 asymmetric usage to share intermediate key
- Intermediate key encrypts secret with **AES-256**
- Your private RSA key is encrypted with a derived form of your master password **PBKDF2(SHA-256)**

Logic level adds more confidentiality and features

- **Stateless** requests are signed by user private key
- Server verifies the **signature** then the rights on the claimed secret access (with anti-replay mechanism)

TECHNICAL STUFF

Technologies

Everything is JavaScript

Use simple CouchDB database, easy to replicate and scale

https://secret-in.me static content on GitHub

https://api.secret-in.me hosted on IBM Bluemix

CouchDB on IBM Cloudant

Wrap up

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WRAP UP

Tradeoffs and limitations

WebCryptoAPI is **young**
Very few compatible browsers (only works on Chrome and Safari on iOS 11)

Crypto **takes time**
Particularly slow on mobile browser (~x5 slower)

No god mode
You only control your own data

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WRAP UP

Features Summary

Create/Update/Delete a **Secret**

Share with permissions (Read, Write, ReShare)

Folders to organize your secrets

2 Factor Authentication (by token or by device with shortpass)

Offline Mode (with non-shared secrets editable)

Export/Import between secret-in instances

Lib v2 (out last week) adds nodeJS adapter (based on node-forge) to be able to build bots

WRAP UP

Coming Next

SOON

Secret history
Trace access
UI/UX improvement
Documentation improvement
Institutional website

NOT SO SOON

Native mobile application
Browser extension
Import from other password manager (only from KeePass for now)

How to get it ?

Test it : https://secret-in.me

GitHub : https://github.com/secretin

Self-Host :

https://github.com/secretin/secretin-server#setup-in-production

https://github.com/secretin/secretin-app#setup-the-app

Twitter : @agixid, @antoinelyset, @calyhre, @dqms_output, @vcent_ricard

My contact : florian@scrt.fr