Remembrall
Security-enhancing Browser Extension

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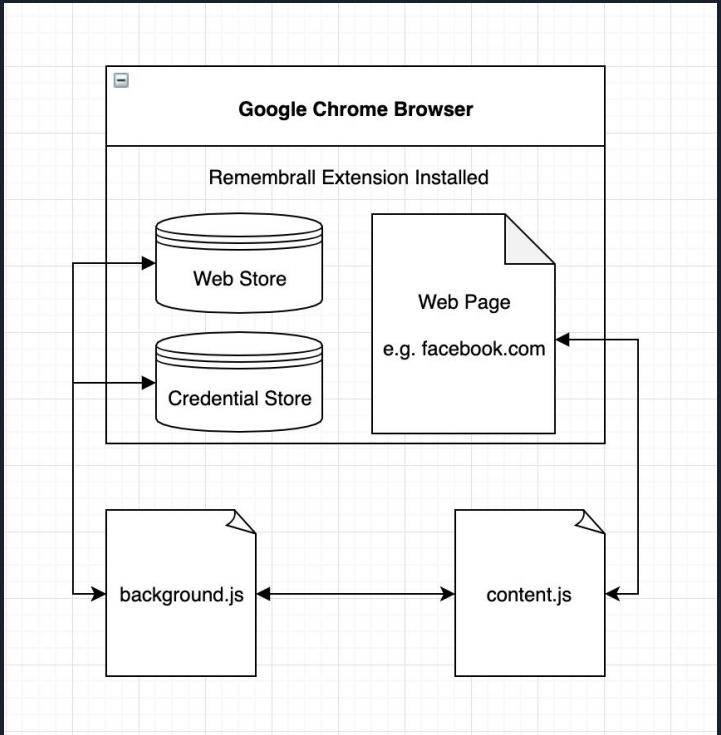
Introduction

In this project, we have designed and developed a browser extension that will help users browse more securely.

Features:

- Detect password reuse
- Detect the entering of passwords on the wrong website
- Modify link-clicking behavior

Technical Overview



The application has three main scripts, each one to serve a specific purpose.

- background.js
- content.js
- extension_popup.js

- Message passing for communication

- PouchDB - open-source JavaScript database library, enables application to store data locally while offline.

Technical Overview - Database Schema

Credential Store

```
{
  h_password  :  "5672a3ada5f155f17b21255fd73b7025c0ed54f938f20918512b6bc844462b84"
  h_url       : "9e2395b33d446776ecf84ea2ec46a39a1e88524f00ef6def15398d52c293d83"
}
```

Web Store

```
{
  url  :  "google.com"
}
```

Design Decisions

- Chrome Web Browser:

  65.6% market share (April 2019).

- Private Database - PouchDB(Inspired by CouchDB):

  Open-source, “Design to run with web browser”, uses Map/Reduce, Simple APIs

- PBKDF2 for hashing:

  Cryptographically slow, makes attacker job much harder.

- Static List of Alexa top 10000 domains:

  Coz APIs are PAID!

Identifying Signup Page

IF (FORM ELEMENT + METHOD == “POST”)
AND (FORM CONTENT has ‘signup’, ‘create account’ etc.)

OR

IF (FORM ELEMENT + METHOD == “POST”)
AND (SUBMIT BUTTON has ‘signup’, ‘create account’ etc.)

OR

IF (FORM ELEMENT + METHOD == “POST”)
AND (EMAIL + PASSWORD + SUBMIT + EXTRA)

THEN
Page contains SIGNUP form

Identifying Login Page

IF (FORM ELEMENT + METHOD == “POST”)
AND (FORM CONTENT has ‘login’, ‘signin’ etc.)

OR

IF (FORM ELEMENT + METHOD== “POST”)
AND (SUBMIT BUTTON has ‘login’, ‘signin’ etc.)

OR

IF (FORM ELEMENT + METHOD== “POST”)
AND (EMAIL + PASSWORD + SUBMIT)

THEN
Page contains LOGIN form

Identifying Malicious Links

PROCESS THE PAGE and COLLECT all LINKS

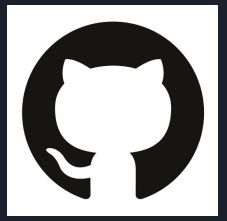
GET the unique SET of DOMAINS

CHECK existence in the Web Store

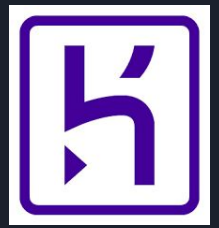
SET onclick Listeners for links Not in White List

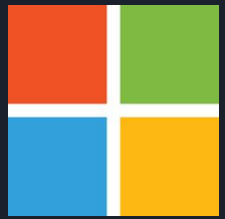
Few websites where the extension has been tested








Demo

Use Case 6 : Whitelisting URLs (Dismiss Once)

STEP 1 : Upon receiving the confirm pop up, if Cancel is clicked the URL should not be added to the DB

STEP 2 : Same warning should pop when we revisit website again.

Use Case 1 : Successful Signup

STEP 1 : Visit *facebook.com* login/signup page

STEP 2 : Try Signing Up using dummy credentials

OUTPUT : On successful sign-up, the credentials get added to the Credentials store

Use Case 2 : Password Reuse

STEP 1 : Visit *facebook.com* login/signup page

STEP 2 : Try Signing Up using another set of credentials and use the same password as used in Usecase 1

OUTPUT : An alert box is triggered warning the user about the password reuse.

Use Case 3 : Phishing Attack

STEP 1 : Visit *yahoo* login/signup page

STEP 2 : Try logging in using the same password as used in Usecase 1

OUTPUT : An alert box is triggered warning the user about possible phishing attack.

Use Case 4 : Check for Whitelisted URLs

STEP 1 : Visit *google.com* and search for a query

STEP 2 : After the results are rendered, click on a random URL.

OUTPUT :

IF the URL exists in the Whitelisted webstore,

Do nothing

ELSE

Confirm box pops up warning the user about the URL not being whitelisted

Use Case 5 : Whitelisting URLs (Dismiss Forever)

STEP 1 : Upon receiving the confirm pop up, if OK is clicked the URL should be added to the DB

STEP 2 : No warning when we visit the website again.

Limitations

01 The extension fails to identify the login and signup pages when the website does not make use of HTML forms for the same.

02 The extension fails performing Task 3 when the website masks the redirection link on anchor tag, e.g. news.google.com

03 Opening the page in the new tab, does not block.

Are we forgetting something?

Remembrall
Remembers it all!

Questions?