**3000 word cap**

Password Manager

(Title WIP)

# Introduction

This report presents the COMP1004 coursework. The password manager created for this coursework focuses on data security.

Alongside the coursework, the Software Development Lifecycle (SDLC) is also discussed. An agile driven approach has been used for this project.

# Use of the Software Development Lifecycle (SDLC)

(Name WIP and section pending)

This project was planned over a week, with other password managers (such as the chrome password manager) being investigated.

Once planning concluded, the rough period of development was established, with sprints being assigned tentative tasks.  
A screenshot of a computer

Description automatically generated

In total, 10 sprints were planned, though the exact tasks assigned to these were significantly adjusted over the duration of the coursework, a result of tasks not being completed in the sprint period and new ones being discovered during development.

# Design Document

(Design pending)

## Project Vision

This password manager is for individuals to help store their passwords in a secure way. The application stores passwords in encrypted files, and these are only decrypted when a successful sign-in occurs, preventing unauthorised access to passwords.

## Background

Password managers are important for the secure, everyday use of computers. Provided they are competent in securing their accounts, a person will have several passwords, most of which are not memorable. A user can either store their passwords physically (which is less portable), in an unsafe plaintext file, or in a secure password manager.

Password managers are effectively databases which store usernames and passwords for different sites in a controlled form. A strong manager protected behind a strong access password means the user only needs to remember one password (Li, 2014)

A password manager must be secure, otherwise it can introduce a significant vulnerability by potentially exposing all of a users’ passwords. Many managers have security flaws, with 4 out of 5 studied password managers in a study being vulnerable to attacks which reveal credentials (Li, 2014).

Regardless of where password manager data is stored: portable, cloud or local, there are dangers. This is because USB Memory Sticks and Smartphones can be stolen, and cloud storage can be accessed without permission by attackers. Though storing locally is more secure, requiring an attacker to either gain access to the computer, it is still not acceptable. Because of these threats, the password manager must use a secure format. (Gasti, 2012).

## User Stories and Use Case Scenarios

Below are the User Stories identified for this project. These are shown in a Use Case Diagram and decomposed later in this section.

* As a user, I want to have easy access to my passwords so that I can spend less time signing in and won’t lose them.
* As a user, I want my log in information to remain secure, so it is unlikely for my accounts to be breached.
* As a user, I want secure information (such as my passwords) to be behind a sign in, so malicious actors cannot access them even if they gain access to my computer.
* As a user, I want to be able to reset my login password, so if I forget it, I can still access my other passwords.
* As a user, I want the application to be easily accessible, preferably without requiring any prerequisites, so it is easier to install and use.  
  Note: As this is a web-based project, the JavaScript is visible to anyone using inspect element. For security reasons it is necessary to find a way of hiding the encryption method. The best way of achieving this is through an API.
* As a user, I want to be able to add new passwords for when I create new accounts.

Below is the Use Case Diagram for these stories:A diagram of a sign in

Description automatically generated

Decomposed Sign In process:

|  |  |
| --- | --- |
| Usage: | Sign In |
| Description: | The user attempts to sign in to the password manager. |
| Precondition: | The user has a stored account and key, credentials are provided |
| Post-condition: | The user is signed in and credentials are displayed. |
| Error Situations: | There is no stored account / key. The stored account does not match the provided credentials. |
| Error State: | Waits for the stored account / key to be provided and for the user to try again. Error displayed stating incorrect credentials have been provided. |
| Actors: | User |
| Triggers: | User needs to gain access to the password manager. |
| Standard Process: | 1. User enters their username and password into the respective textboxes. 2. User presses the Key button and provides a key (JSON) file. 3. User presses the Sign In button and provides the credential storing (JSON) file. 4. System verifies the username and password are identical to the stored ones. 5. System displays credentials, decrypted using the key file. |
| Alternative Process | 3’. User does not provide a file. 4’. System waits for the user to press the button again and provide a file.  4’’. The username, password or both do not match.  5’’. System displays an error message.  4’’’. System detects that the credential storing file is incorrectly formatted.  5’’’. System displays an error message.  5’’’’. System fails to decrypt the credential storing file as the key file is wrong or incorrectly formatted. 6’’’’. System displays an error message. |

The other processes would also have been decomposed, however these do not have alternative processes, and regardless of user input will always run the same.

## Architecture

(Architecture pending – the architecture contains UML class diagrams)

A sequence diagram for the Sign-In process:  
A Sequence Diagram for the Sign In process of the Password Manager.
The five lifelines are Webpage, signIn, extractDetails, the Crypto API, and createContainer.

A sequence diagram for the Saving process:  
A sequence diagram for the Saving process of the Password Manager.
The three lifelines are Webpage, updateFile, and the Crypto API.

(Note: There is a sitemap in the template, but this is a SPA, so it is irrelevant)

## Page Design

(Also known as “Wireframes” in the template)

Below are the initial page designs, these were adjusted during implementation.

A black text on a white background

Description automatically generated

A sign in box with red text

Description automatically generated

The sign-in box is displayed on top of the main password manager page, which does not yet have any information displayed, and may be blurred.

Warning: A wireframe is a webpage design with javascript elements and images hidden.

A screenshot of a computer

Description automatically generated  
This is an initial prototype page.  
When functional, no passwords will be shown until the user signs in, at which time they will be decrypted and the containers filled.  
The contents of Website 1 can be shown and hidden.  
Show Password sets the password box from the “password” type to “text”, making it visible and able to be directly copied.  
Copy Password copies the contents of the password box to clipboard without showing it.

A screenshot of a computer

Description automatically generated  
**PLACEHOLDER**

## Issues and Constraints

(Pending, discusses issues of learning new technologies, planning and accounting for modules and deliverables)

This project is limited in terms of what can be used. Ideally, an encryption algorithm would be in C#, C or C++, unfortunately it is required that the scripting side of the project is exclusively done in JavaScript. This means that the application is less secure than alternatives, and many open-source encryption / hashing algorithms cannot be used.

As the program required a number of HTML element creations, namely the creation of the Credential containers, and these elements needed to be uniquely identified, the function for creating containers is incredibly large, almost certainly being slower than using HTML templates to create non-uniquely identified elements. The only potential improvement that could be made would be to use templates, and then modify IDs, though this has not been implemented.

# GitHub Repository

<https://github.com/CentralC0re/COMP1004>

# References

All references here. Standard format:  
*Title, Section (page, chapter, etc), Source: URL (Access Date)*

The Emperor’s New Password Manager: Security Analysis of Web-based Password Managers (Zhiwei Li et al), Page 3, Section 2.1, Source: <https://www.usenix.org/system/files/conference/usenixsecurity14/sec14-paper-li-zhiwei.pdf> (Accessed 28/11/23)

On The Security of Password Manager Database Formats (Paolo Gasti and Kasper B. Rasmussen), Section 1, Source: <https://ora.ox.ac.uk/objects/uuid:926086ea-180b-4f11-a599-2522a80837f4/download_file?file_format=application%2Fpdf&safe_filename=pwvault.pdf&type_of_work=Conference+item> (Accessed 28/11/23)