



# Using Client-Side Substitution Ciphers to Enhance Password Strength

User Manual

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## Introduction

This document is targeted at users of the password enhancement system herein referred to by its marketing name of “Mappa”. This document aims to showcase general use of the system and provide all the necessary instructions to install the application and begin using it. It also briefly details how the back-end would be set up by a business deploying Mappa.

## Browser Extension – General User

### System Requirements

This application will run on any modern Desktop operating system, this operating system must have Google Chrome or Mozilla Firefox installed as the extension runs within this software. **Chrome is the recommended browser to run this extension, as the Firefox User Interface has not been polished.**

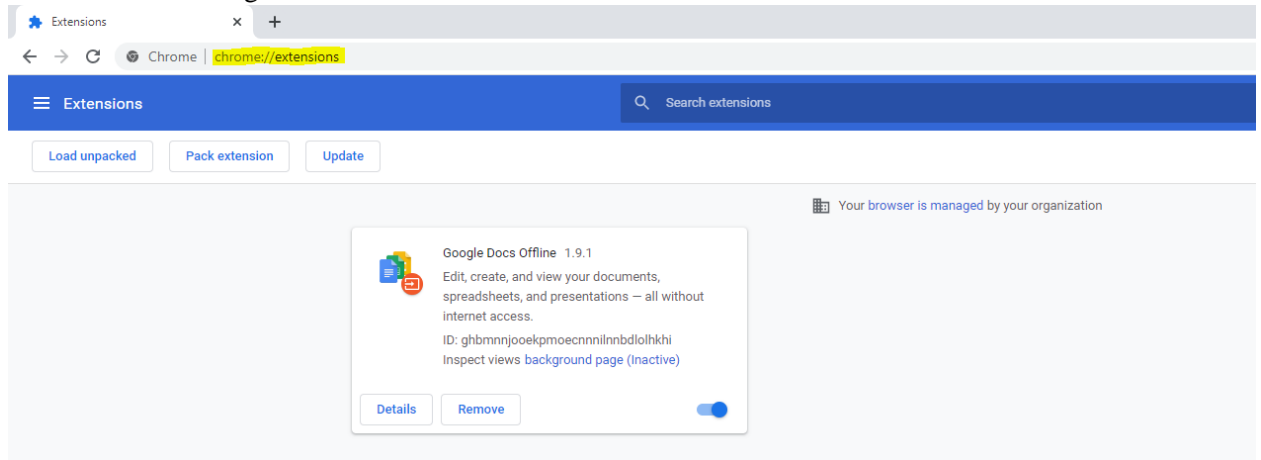
### Installation Instructions

As the extension was not uploaded to an extension store by the end of the project, the extension must be manually added to the browser in developer mode.

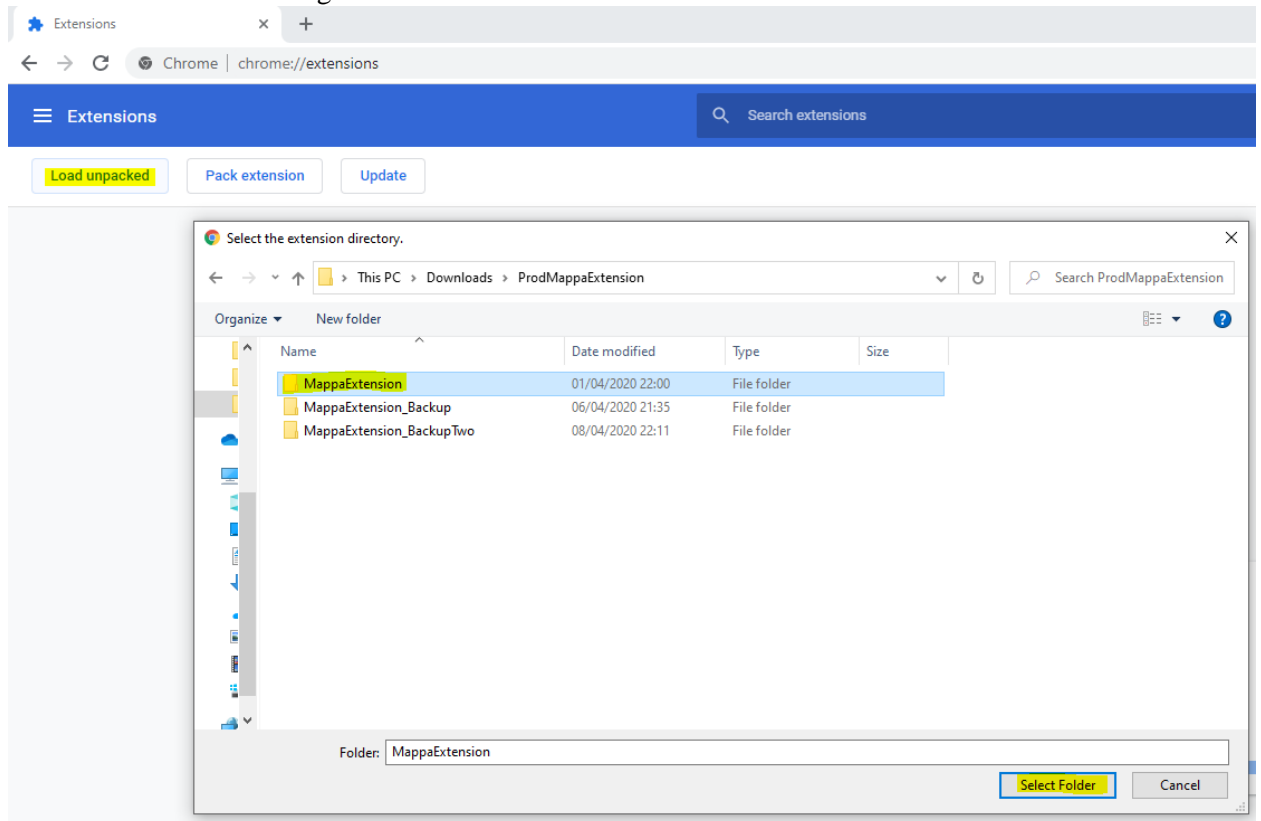
Installation instructions for both Chrome and Firefox are below. Before following the steps for either browser **you must ensure you have a folder on your computer containing the extension.**

## Chrome

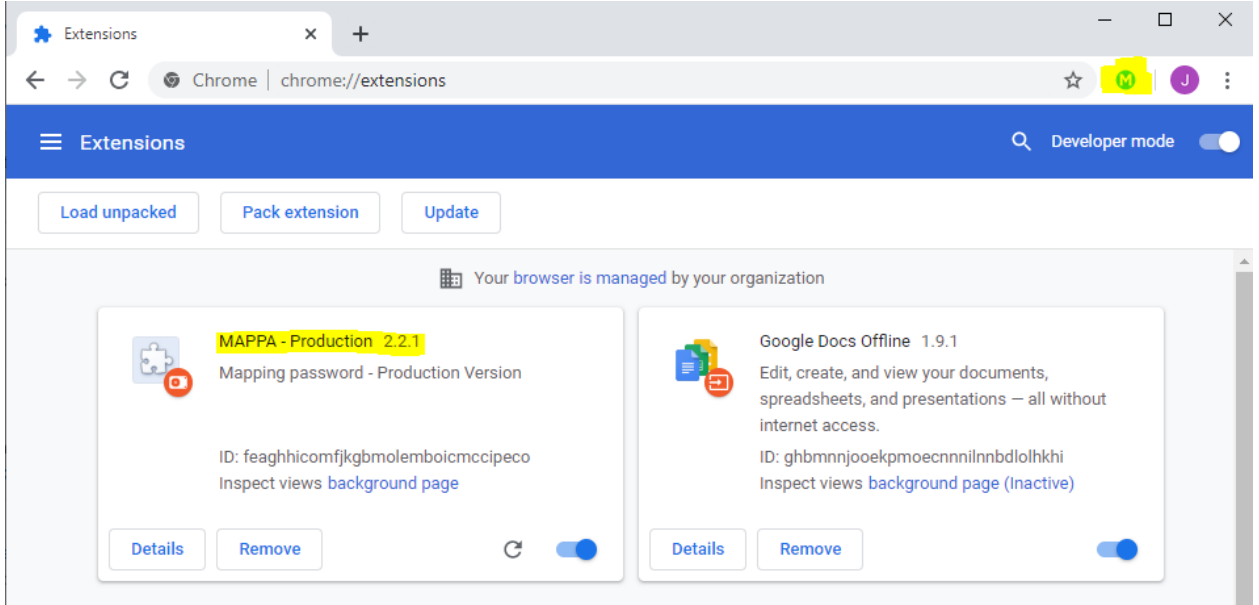
1. In the URL bar navigate to *chrome://extensions*



2. Enable Developer mode by clicking the switch at the top right-hand corner of the screen. Then click *load unpacked*, at the top left-hand corner.
3. Select the folder containing the extension.

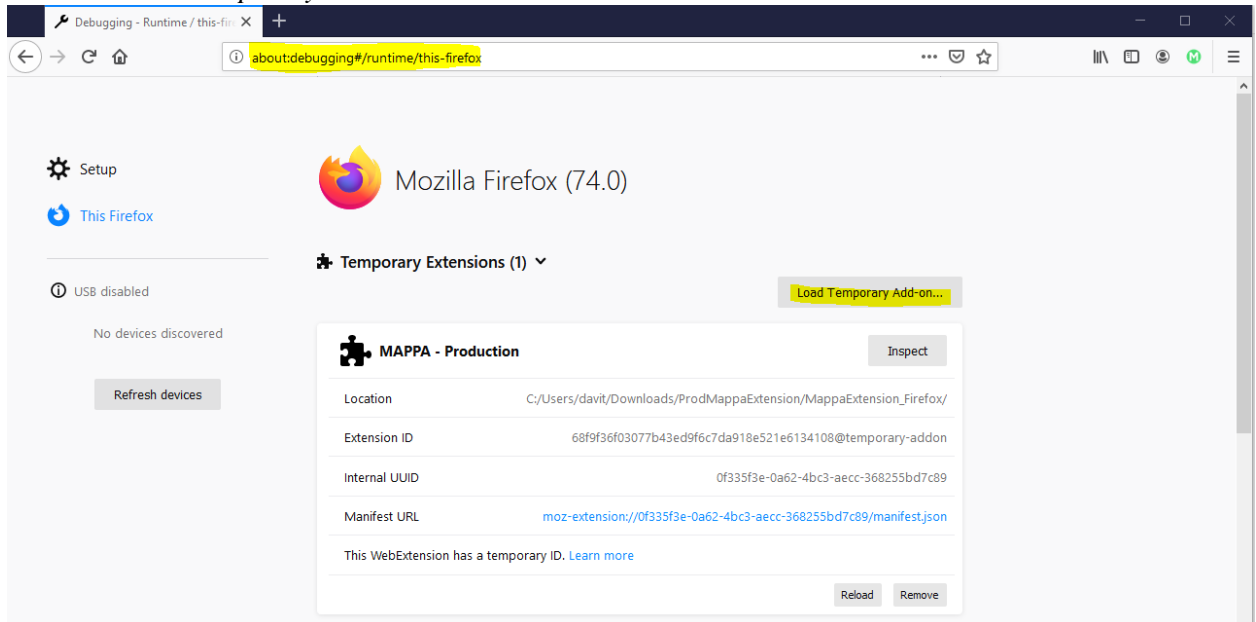


4. If installation was successful, Mappa will appear as an extension and an icon for the extension will appear beside the address bar.

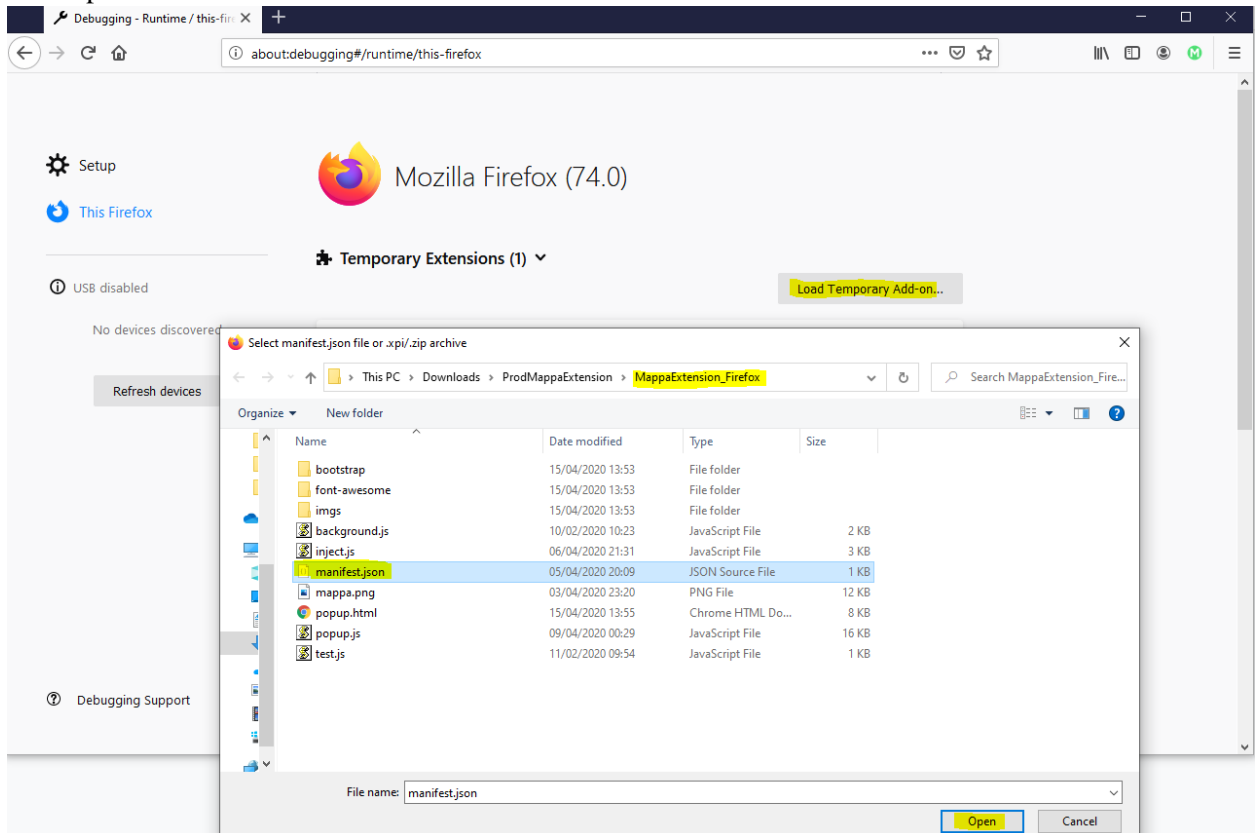


## Firefox

1. Navigate to `about:debugging#/runtime/this-firefox`.
2. Click the **Load Temporary Add-on** button.



3. Select the Folder containing the Firefox Mappa Extension, then select the `manifest.json` file and click open.



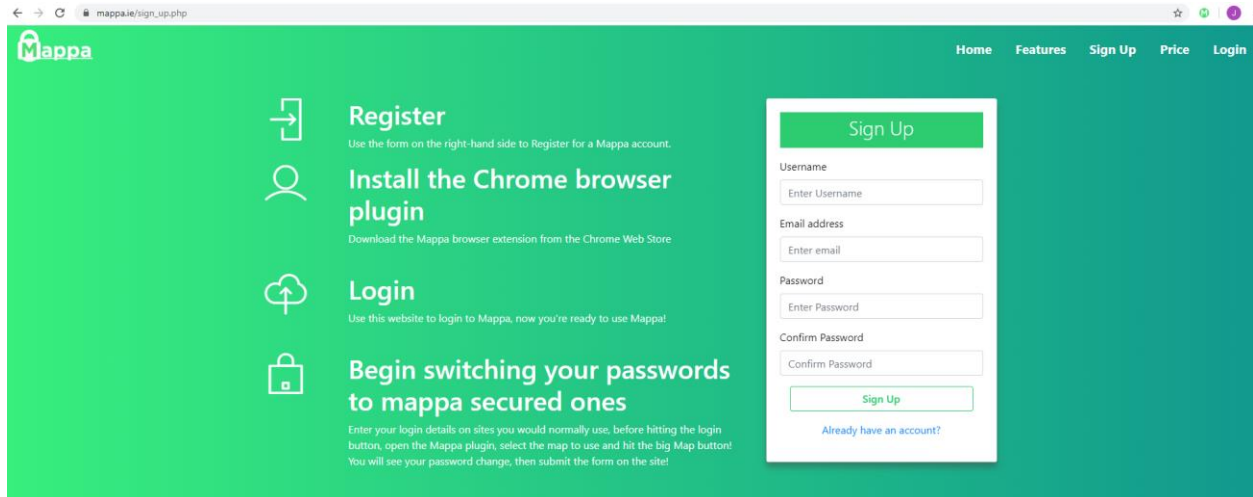
4. If installation was successful, the Mappa icon will be located at the top right-hand corner beside the address bar. The extension is now ready for use.

## System Usage

The below section details all the steps required to begin using Mappa for its purpose.

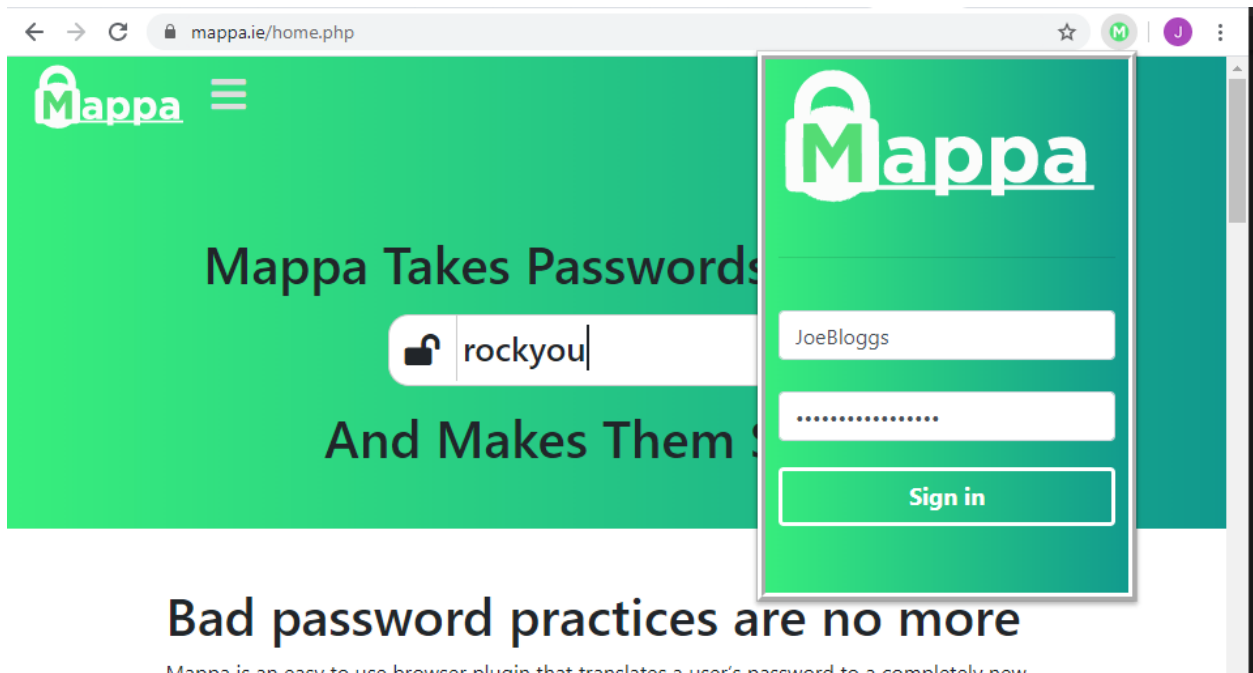
### Registration

Before using the extension you must have an account that you can sign into. You can sign up just like you would for any other site, by providing a username and password. The password chosen here needs to be highly secure and as such there is a minimum length of 15 characters.

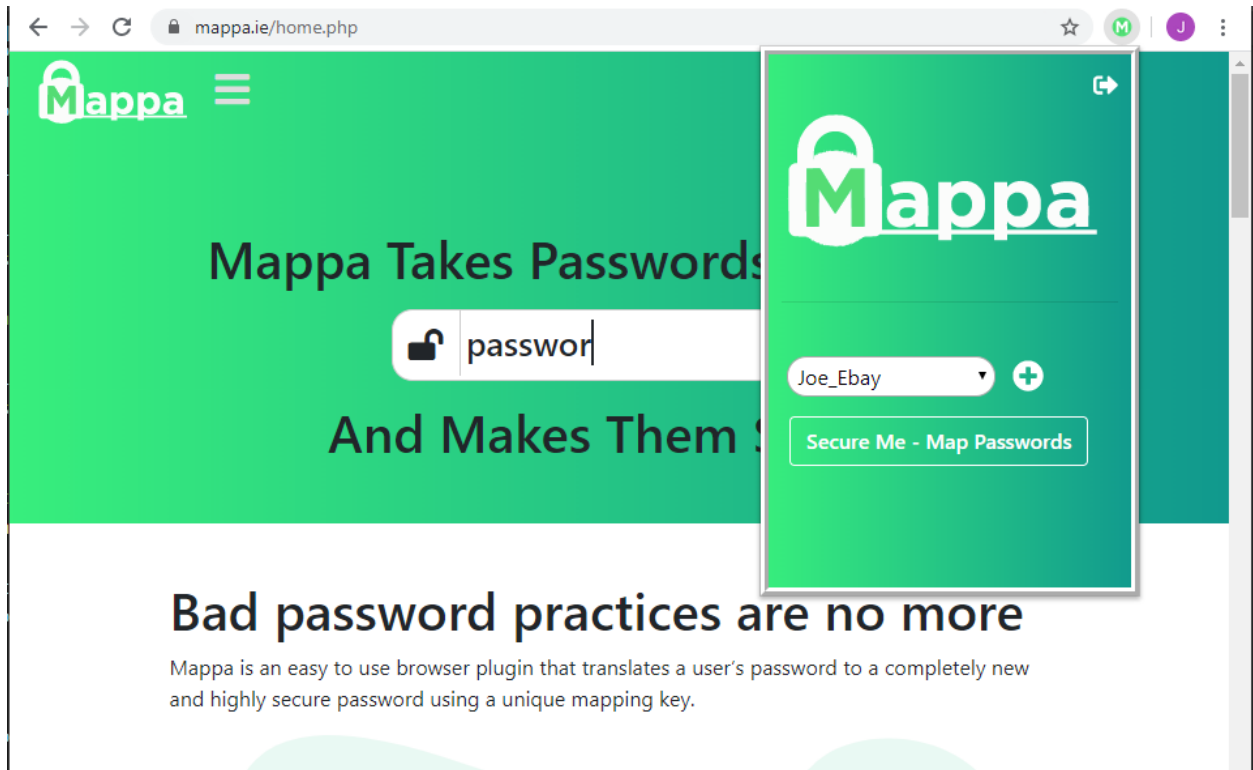


### Logging In via Extension

Once you have registered for an account, you can log in using the extension that was previously installed. Simply click the icon at the top right of your browser and provide your credentials.



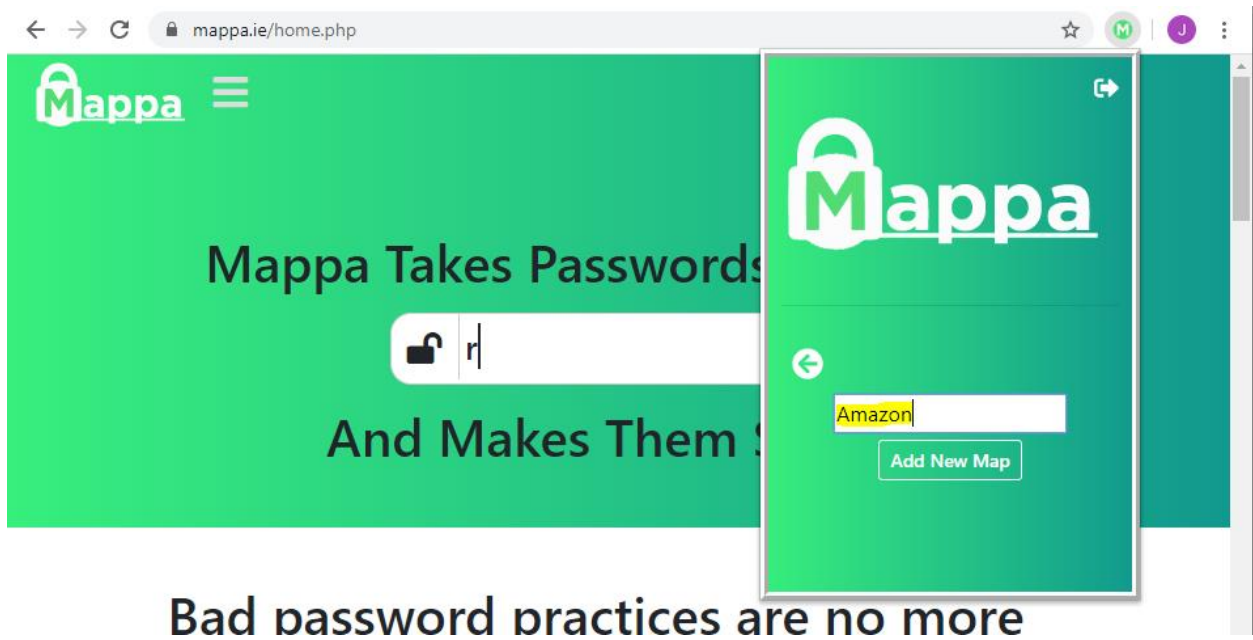
Once you have logged in, you will be greeted by the following screen.



### Creating Maps

To create a Map, select the + icon, type the desired map name and press the add map button.

You should create a map for every service you plan to use Mappa with.





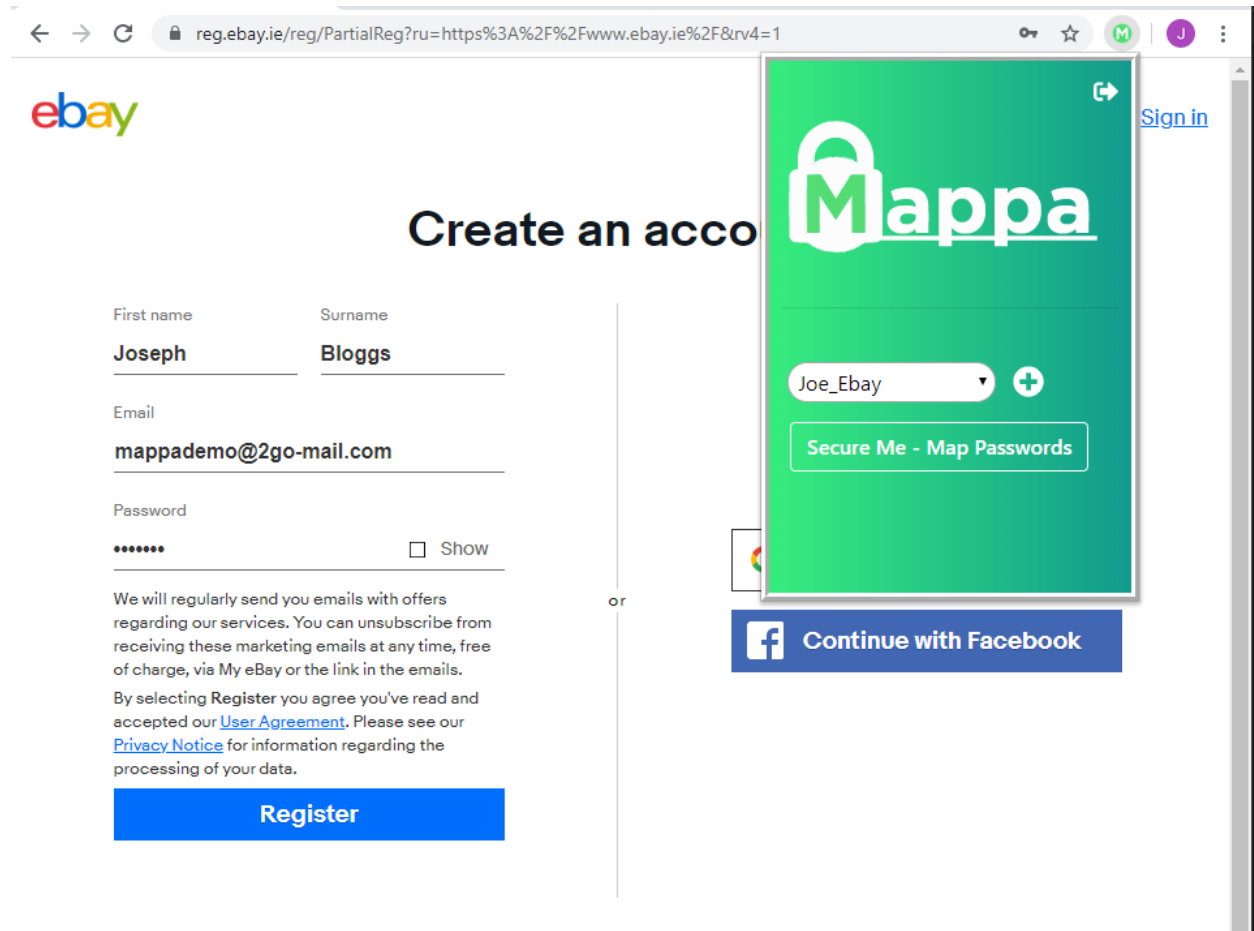
## General Usage

### Signing up for services using Mappa

Now that you have created a map for some services, you must either register for these services using Mappa, or integrate Mappa with existing accounts. An example for Ebay is shown below.

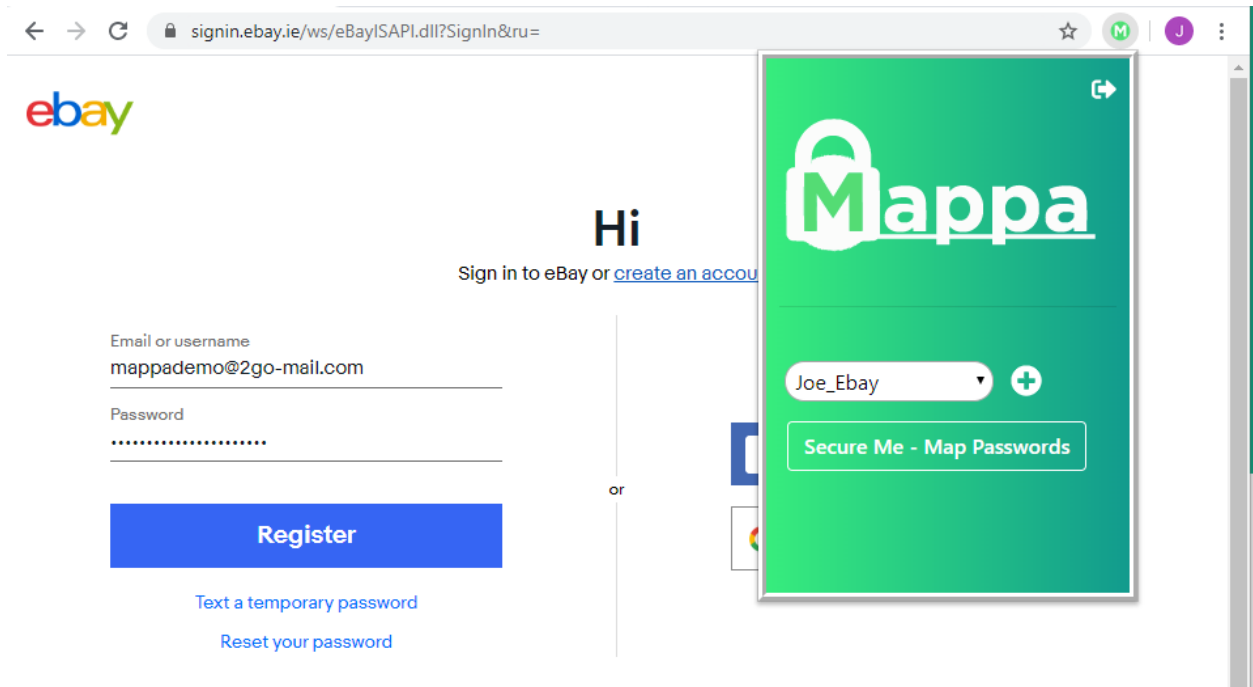
Type in your registration credentials as normal, then before submitting the form, load the Mappa extension and select the map created for this Ebay account. Press the Map Passwords button.

The length of the password field will change, and you can sign up as normal from here on.



The screenshot shows the eBay registration page at [reg.ebay.ie/reg/PartialReg?ru=https%3A%2F%2Fwww.ebay.ie%2F&rv4=1](https://reg.ebay.ie/reg/PartialReg?ru=https%3A%2F%2Fwww.ebay.ie%2F&rv4=1). The page title is "Create an account". The registration form includes fields for "First name" (filled with "Joseph"), "Surname" (filled with "Bloggs"), "Email" (filled with "mappademo@2go-mail.com"), and "Password" (filled with "\*\*\*\*\*"). A "Show" checkbox is next to the password field. Below the form, there is a "Register" button. A "Sign in" link is visible in the top right corner. The Mappa extension is overlaid on the right side of the page, showing the Mappa logo, a dropdown menu with "Joe\_Ebay" selected, and a "Secure Me - Map Passwords" button. Below the extension, there is a "Continue with Facebook" button.

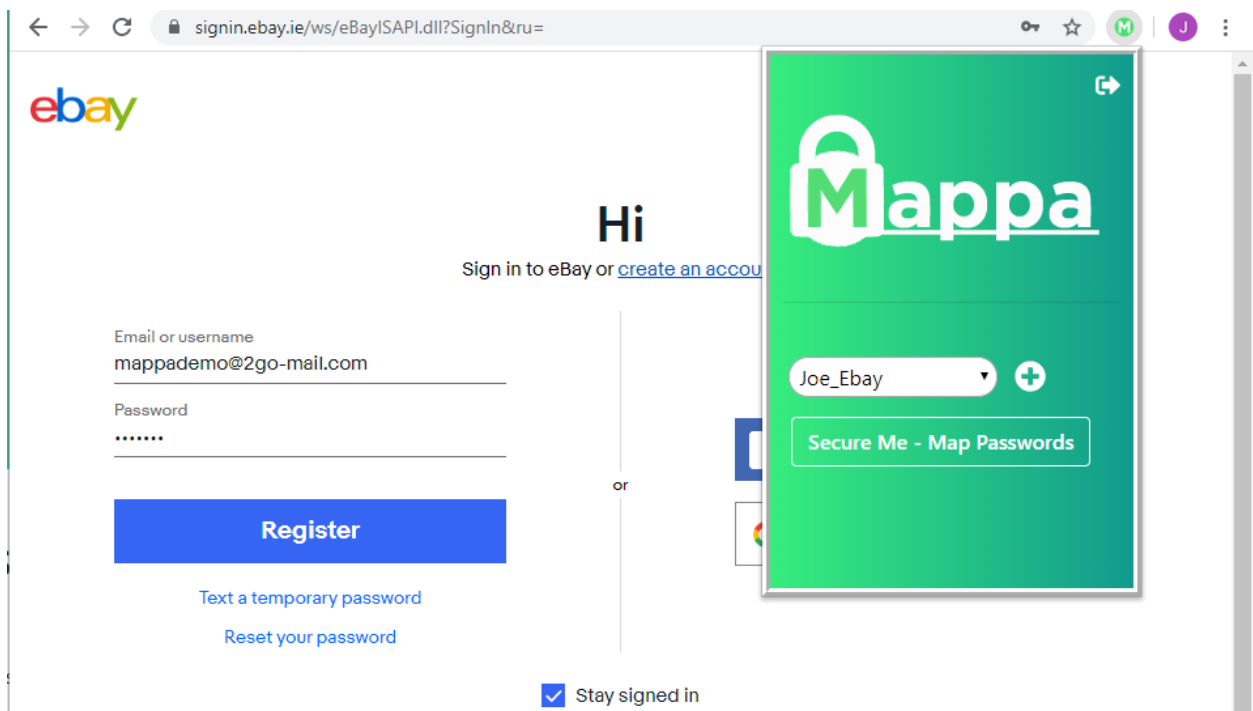
Note how the password length has changed, the easy to remember password has been substituted according to the Ebay map.



### Logging into services using Mappa

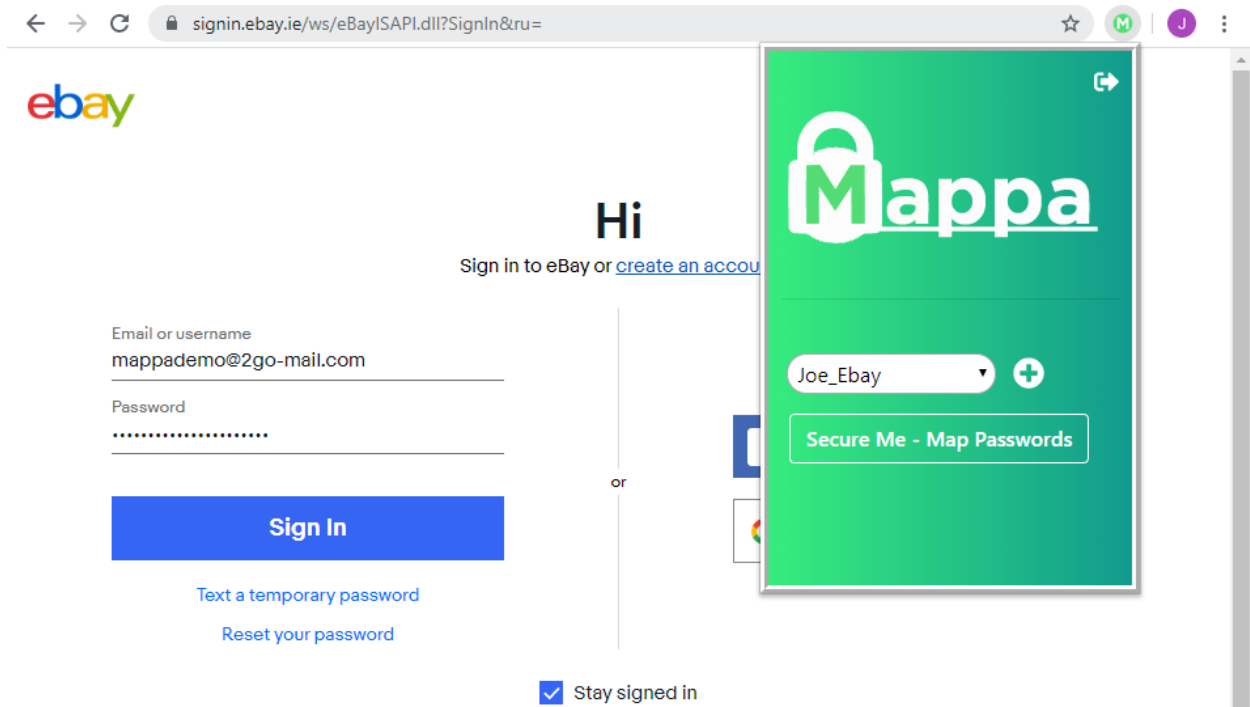
Now that your Ebay account has been secured with Mappa, you will need to use Mappa to sign in.

Visit the site as normal and enter your easy to remember password, in this case the password chosen was "lemons!"



Next, select the map used for Ebay and press the Map Passwords button.

The password field is updated.



You can now press the sign in button, and sign in as normal, knowing that your account is secured by Mappa.

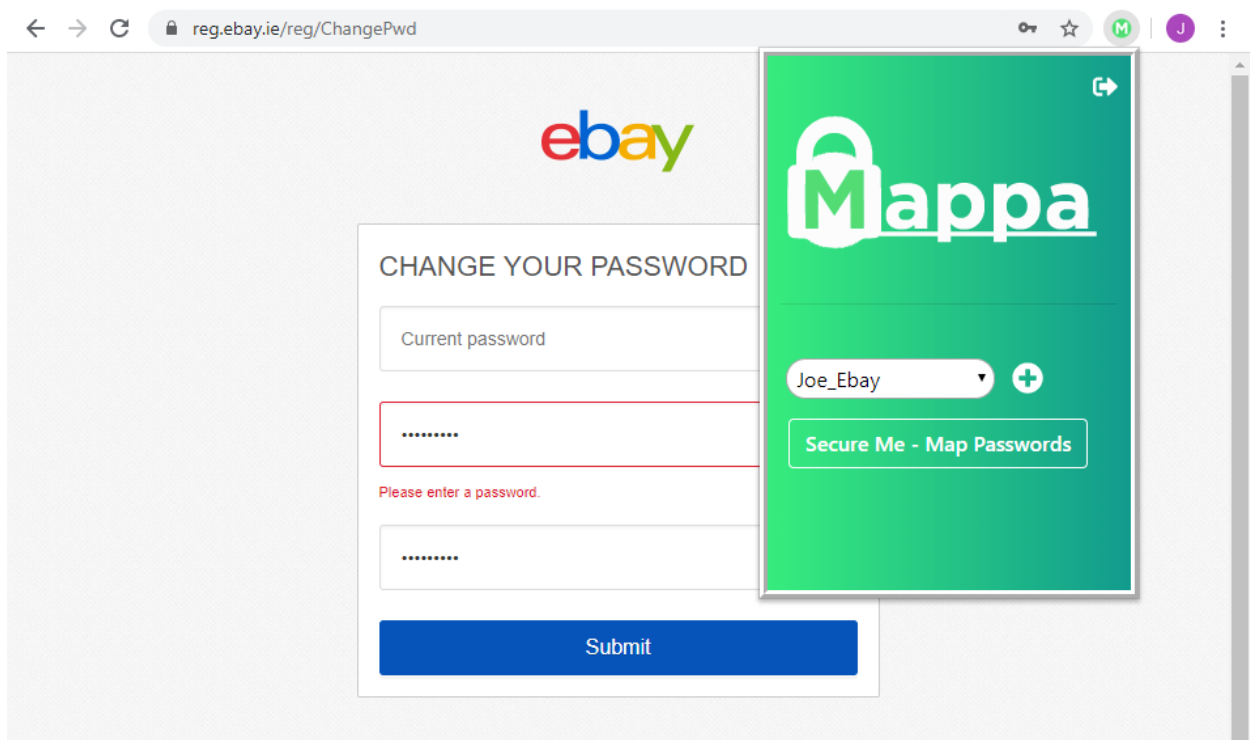
### Integrating with Existing 3<sup>rd</sup> party Services

Integrating with 3<sup>rd</sup> party solutions is a little more complicated than registering with Mappa. Here we will show an example using Ebay.

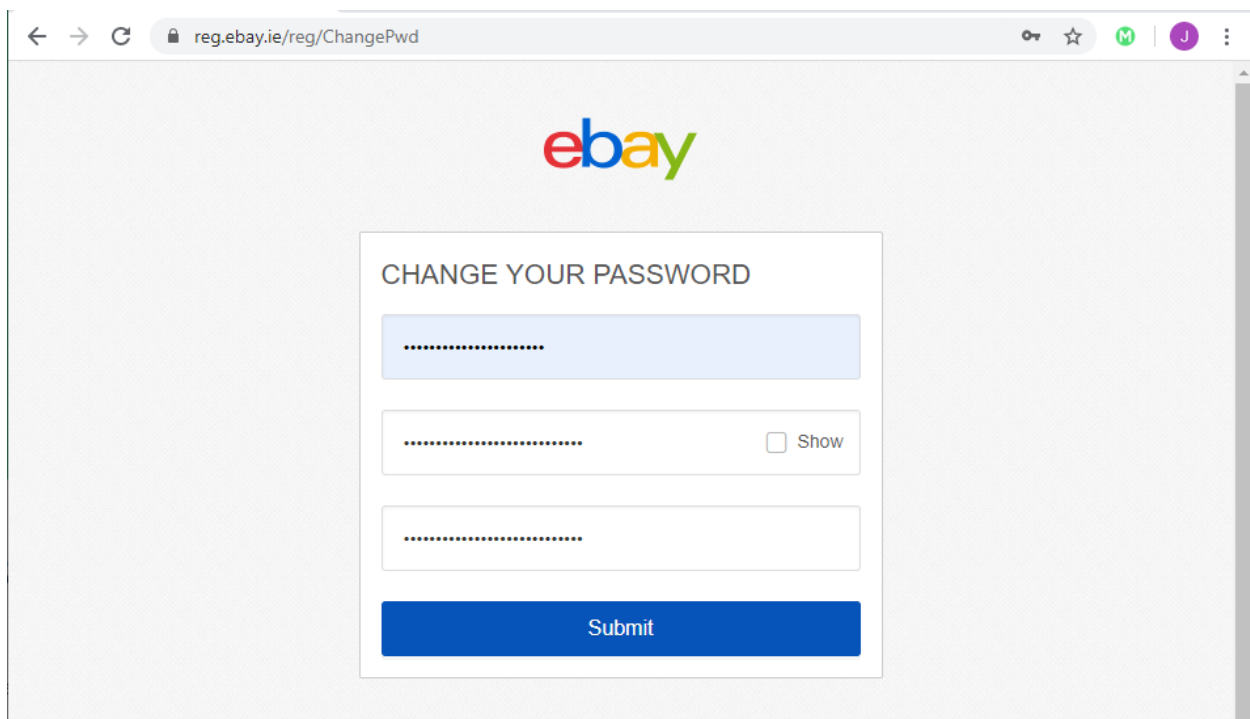
Firstly, navigate to the change password section of the service, in this case, Ebay.

Firstly, entered your new password twice as prompted, this can be a simple phrase, as it will be secured by Mappa. In this example, "raspberry" was used.

Next, open the Mappa extension and map the password using the Ebay map. If this is not a map currently made for Ebay, create one first.



Next, enter your current password and submit the form as usual.



You can now submit the form, knowing that your account is secured by Mappa.

You can now follow the General usage guide to log into this account in the future.

This process can be repeated with any account you want to use Mappa with, the password “raspberry” can even be used on every account securely, provided a different map is used for each account.

## Back-End Configuration – Not Applicable to General User

Below is an outline of the general steps to configure the back-end web server that enables Mappa to function.

### Hosting

Prepare a server by installing an apache server, mysql based database and php. In the case of Mappa, a cloud environment was used. An Amazon Web Services EC2 instance running a LAMP server. More details on installing LAMP servers on EC2 instances can be found on the AWS website.

Host the required Mappa php files on the server in the correct directory structure.

Configure any necessary load balancing to enable the server to be accessed from the internet.

Initialize the database as per the .sql file included, ensure a unique password is used for the database, it is not advised to use any default passwords.

### Hardening

Configure TLS on the server by obtaining a digital certificate from a certificate authority such as Let's Encrypt.

Configure modern and secure cipher suites and enable HTTPS.

Configure required http headers on the apache server for security, such as XSS Protection and Cache Control. More details to required headers is given in the Design manual.

Create and apply access control lists on the server, specifying what IP addresses can access the server directly over various ports. Disable http and configure the server to upgrade these requests.