

# CMT 120 Assessment 2 Report

Student Number: C22076087

Openshift URL: [Personal Digital Portfolio \(cf.ac.uk\)](#)

<http://c-22076087-cmt-120-cw-2-git-flask-cmt120-c22076087.apps.openshift.cs.cf.ac.uk/>

Git Repository:

[https://git.cardiff.ac.uk/c22076087/c22076087\\_cmt120\\_cw2](https://git.cardiff.ac.uk/c22076087/c22076087_cmt120_cw2)

## Security

To give my Flask application enhanced security, I decided to implement an identity and access management system with Flask-Login, whereby a user can sign up for an account in order to rate and interact with the portfolio via a comment and rating system. This includes a hashing system for passwords, an email confirmation provided via Flask-Mail, a password recovery form, and also optional two factor authentication (2FA). Due to the lack of data exposed by a compromised account, this is optional. However it would be required on sign up if sensitive information was being stored.

2FA is implemented via a possession factor, with users prompted to download the google authenticator app and scan a QR code to share a secret time-based one-time password. I used the PyOTP library for this, and sought to follow their recommendations on security standards. My application generates the secret randomly, ensuring anonymity between users. Then it is stored in the Cardiff University database, which requires additional authentication to access. To prevent replay attacks, the most recently used passcode cannot be used twice and is thus stored and validated against when using 2FA. This ensures that even if an attacker cracks a password, and can spy on the possession device, then the account is still not compromised as the code cannot be reused. Additionally, if a user ever wants to disable 2FA then they must enter their password and a new passcode in order to confirm their identity and decision.

To improve upon this I would first ensure that all communications for my website use a HTTPS connection. Without this any malicious third party could intercept sensitive data, and my site would be extremely vulnerable. I would also throttle requests to the server in order to slow down any brute force attacks, as this is a current vulnerability with regards to brute forcing of both passwords and 2FA passcodes. Further to this a user should be able to recover an account where the 2FA is lost. This would need to be done carefully, as it could open up another exploit for potential hackers. However this could be achieved in conjunction with an individualised security question and administrator approval. Another improvement is storing the 2FA secret in a separate database to the hashed passwords. Therefore, if there was a breach, then users would not automatically have their 2FA secrets compromised. Additionally the OTP secrets could be encrypted in the database in order to prevent them being exposed in the event of a breach.

## Useability

In order to give my website a professional and intuitive design, I decided to use Bootstrap 5 as my CSS and Javascript framework. By dynamically generating HTML elements with specified Bootstrap 5 classes, I ensured that my website was styled to a professional standard. As approximately 20% (Web Tech Survey. 2022.) of all websites use bootstrap, this grants a level of familiarity which allows a new user to instinctively navigate and interact with my website. In order to ensure consistency throughout all pages, I separated each section of page content onto a Bootstrap 5 Card, and any repeated content was styled using Bootstrap 5 lists.

With Bootstrap I was able to style a variety of HTML elements in useful and intuitive ways. One example is creating an alerts section at the top of every page, styled with a colour interpreting the type of message and a dismiss button with a fade animation. I also created a user friendly navbar with drop down menus for user pages and Flask-Admin for admin users. Forms were styled alike for consistency and clarity, while links within the content body were also styled as forms in order to draw attention and differentiate them from surrounding text. Bootstrap has the benefit of having a responsive design component built in, meaning any mobile user can access a user friendly version of the site specifically styled for smaller screens.

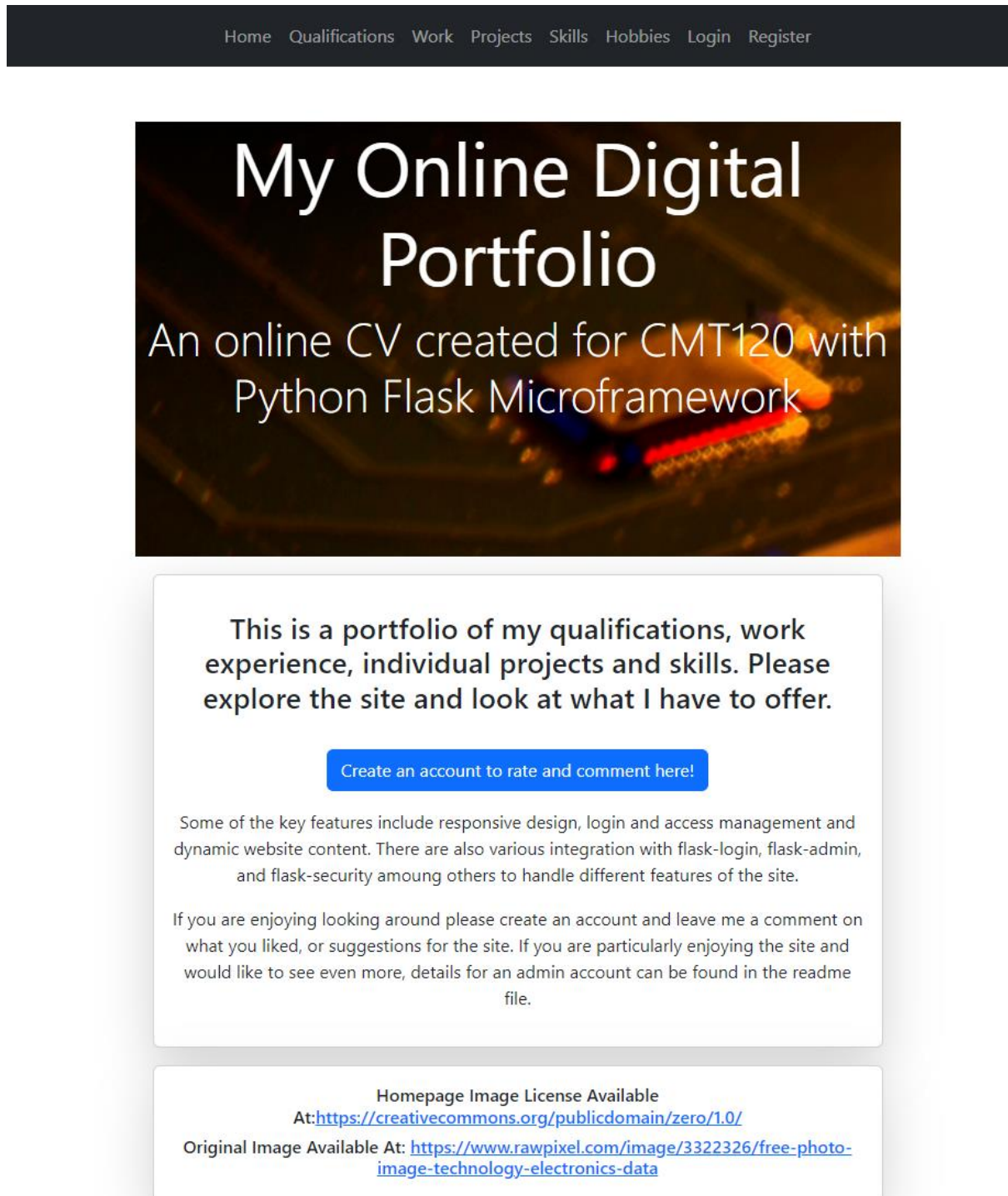
In future, I would improve on this by adding more customisation to the Bootstrap stylesheets, as creating a unique website is an important factor in standing out. For instance, the default colour scheme lacks a personal flavour that would help distinguish the site even further. On top of this I would add a more distinctive branding, with logos and personalised images to the site, as well as a distinguishing font style. Additionally, while the mobile version is usable some elements need additional styling. For example, making the mobile navbar collapsed by default would enable the user to instantly see page content, rather than having to scroll down upon landing. With further individualisation certain elements will also require custom styles, and I would add a second stylesheet to the site. This would allow for overall greater control of styling, such as a personalised progress bar to use for the rating system.

One risk of using Bootstrap is bloated loading times. Web users demand pages with low latency, and as Bootstrap contains everything a developer might need, there are necessarily large files to download and compile. I have attempted to counteract that by using a Bootstrap Centralised Distribution Network, ensuring a quick delivery of content. However before deployment testing would be necessary to anticipate performance when large numbers of user are attempting to access the site.

Appendix A, list of advanced functionality:

- Login system
- Password hashing
- Confirmation email with expiry
- Account confirmation via email token
- Account recovery via password reset email
- Password changing through website
- Updating user details through website
- 2 Factor Authentication for user
- QR code to share 2FA secret
- API call to tell a programming joke
- Comment system
- Comments styled individually using javascript
- Rating system, allowing only one rating per user
- Database maintenance through Flask Admin
- Custom validations through Flask Admin
- Hiding of fields and disabling of adding rows for Users
- User admin validation on Flask Admin pages
- Uploading and deleting images through custom Flask Admin page
- Custom links in Flask Admin navbar
- Bootstrap5 stylings across the whole site
- Alert system for events
- Password strength indicator through javascript
- Custom error pages

Appendix B, list of webpage screenshots:



## Qualifications

Please take a look at my qualifications. You can click on any that you are particularly interested in to take a closer look.

If anything seems to be missing or you have any questions, let me know via the comments!

**BSc Mathematics**

**Mathematics A Level**

**Maths GCSE**

### Rating:

This page is currently rated 10.0 out of 10.

Please help me improve by leaving a rating if you haven't done so already.

### Comments:

*Author:* adminuser

I rate myself 10/10!

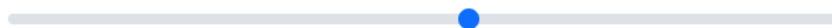
*Date:* 2023-01-20 19:47:56

Leave a comment here!

Submit

Leave a rating here!

**Value:** 6



Submit

## Work

Please take a look through my previous work experience. If you are interested in any particular record click on the link to take a closer look.

Otherwise let me know if you're impressed in the comments!

**Title: System Analyst**

Company: iPipeline

[View](#)

## Employment

**Job Title:** System Analyst

**Company:** iPipeline

**Start Date:** 2020-03-02

**End Date:** 2022-09-01

In this role I worked as part of a software development team, writing system specs, investigating issues and finding improvements. I was also Scrum Master for the data migration team, in which I achieved a PSM 1 certification, and became proficient with SQL and relational data.

### Rating:

This page is currently rated 10.0 out of 10.

Please help me improve by leaving a rating if you haven't done so already.

### Comments:

*Author:* adminuser

I rate myself 11/10

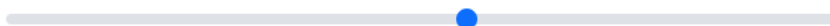
*Date:* 2023-01-20 19:47:56

Leave a comment here!

Submit

Leave a rating here!

**Value:** 6



Submit



## Projects

Please take a look at some of the technical projects I have worked on in order to build my skills.

If anything catches your interest please take a closer look, and let me know if you have any questions via the comments section.

**Title:** Online Digital Portfolio

[View](#)

**Title:** Console Battleships App

[View](#)

**Title:** Iowa Home Prices App

[View](#)

**Title:** Computational Thinking Assessment

[View](#)

## Projects

### Project Title: Online Digital Portfolio

Repository Link: <https://github.com/james-tapp/CMT120-2>

I created an online digital portfolio for my MSc Computing Course at Cardiff University. This was my first significant MVC web app, which I thoroughly enjoyed developing. Although it was challenging at first, I greatly enjoyed stretching myself to finish it, and hopefully you have enjoyed using it!

I used the following skills in this project

Python

HTML

Flask

CSS

Javascript

View the full list of my skills by clicking the button below:

View

## Rating:

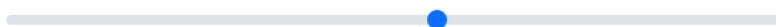
This page is currently unrated. Be the first to submit a rating by completing the form below!

Leave a comment here!

Submit

Leave a rating here!

Value: 6



Submit

## Skills

Please take a look at my skills in technology and computing. Click the view button to see any projects that demonstrate these skills.

If you have questions about my proficiency in any of these skills, please let me know via the comments!

Python

HTML

Data Science

Flask

GCP

R

R Shiny

CSS

Javascript

### Rating:

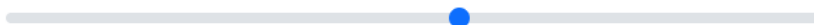
This page is currently unrated. Be the first to submit a rating by completing the form below!

Leave a comment here!

Submit

Leave a rating here!

Value: 6



Submit

## Hobbies

Please have a look at some of the things I do when I'm not at my computer. If anything supprises you, or you have questions let me know via the comments!

### Chess

- I am a passionate chess player, with hopes of obtaining a FIDE recognised title in the future.



Author John Doe, available at <https://www.rawpixel.com/image/3322326/free-photo-image-technology-electronics-data>  
Licence: <https://creativecommons.org/publicdomain/zero/1.0/>

### Rating:

This page is currently unrated. Be the first to submit a rating by completing the form below!

Leave a comment here!

Submit

Leave a rating here!

Value: 6

Submit

## Dashboard

Welcome to your user dashboard Admin.

Use this space to check and update your account details, and if you get bored ask me to tell you a joke!

### Your account details are:

**Name:** Admin

**Username:** adminuser

**Email:** alexandertapp@gmail.com

**Confirmed At:** 2023-01-20 18:25:40

**Last Login:** 2023-01-22 11:59:45

**Current Login:** 2023-01-22 15:22:35

**Login Count:** 8

**MFA:** False

Change your password by clicking below.

Change Password

Update your details by clicking below.

Update Details

Tell me a programming joke

Q:

A:

Enable 2 factor authentication by clicking below.

Enable

## Change Password

Please enter your current password, and then your new password below.

Old Password

New Password

Confirm

Change Password

## Update Details

Please enter your new details for our records.

Username

adminuser

Name

Admin

Update

## Register

Username

newuser

Name

new

Email

dalekdank@gmail.com

Confirm Email

dalekdank@gmail.com

Password

\*\*\*\*\*

Confirm

\*\*\*\*\*

Register

Success: Registration successful!



Information: You will receive an email to activate your account shortly



## Thank you for registering!

You will shortly receive an email with a link to activate your account. Please check your spam folder and allow a few minutes for the email to arrive.

## Login

Username

adminuser

Password

.....

Login

[Forgot Password?](#)

## Two Factor Authentication

OTP

940893

Login

## Disbale Two Factor Authentication

To remove 2 factor authentication from your account please confirm your password below.

Password

Confirm

# Flask Admin











## Welcome Admin

As a verified admin, you can use these pages to add values to the database and update my digital portfolio.

Click the link below to return to the main site.

[Homepage](#)

List (2)With selected ▾

<input type="checkbox"/>		Name	Username	Email	Confirmed	Confirmed At	Last Login At	Current Login At	Login Count	Active	Admin	Mfa Enabled
<input type="checkbox"/>	 	Admin	adminuser	alexandertapp@gmail.com		2023-01-20 18:25:40	2023-01-22 15:29:13	2023-01-22 15:34:46	9			
<input type="checkbox"/>	 	new	newuser	dalekdank@gmail.com		2023-01-22 15:31:06			0			



List (3)[Create](#)[With selected](#)

<input type="checkbox"/>	<input type="checkbox"/>	Author	Qualification	Grade	Year Obtained	Institution
<input type="checkbox"/>	<input checked="" type="checkbox"/>	User('adminuser', 'alexandertapp@gmail.com')	Maths GCSE	A*	2012	Pates Grammar School
<input type="checkbox"/>	<input checked="" type="checkbox"/>	User('adminuser', 'alexandertapp@gmail.com')	Mathematics A Level	A*	2014	Pates Grammar School
<input type="checkbox"/>	<input checked="" type="checkbox"/>	User('adminuser', 'alexandertapp@gmail.com')	BSc Mathematics	2:2	2018	Durham University

List (1)[Create](#)[With selected](#)









<input type="checkbox"/>	<input type="checkbox"/>	Author	Start Date	End Date	Company	Job Title	Content
<input type="checkbox"/>	<input checked="" type="checkbox"/>	User('adminuser', 'alexandertapp@gmail.com')	2020-03-02	2022-09-01	iPipeline	System Analyst	In this role I worked as part of a software development team, writing system specs, investigating issues and finding improvements. I was also Scrum Master for the data migration team, in which I achieved a PSM 1 certification, and became proficient with SQL and relational data.



















Record was successfully saved.























X

List (1)[Create](#)[With selected](#)

<input type="checkbox"/>	<input type="checkbox"/>	Author	Hobby	Content	Image File	Image License	Image Attribution
<input type="checkbox"/>	<input checked="" type="checkbox"/>	User('adminuser', 'alexandertapp@gmail.com')	Chess	I am a passionate chess player, with hopes of obtaining a FIDE recognised title in the future.	chess.jpg	https://creativecommons.org/publicdomain/zero/1.0/	Author:John Doe, available at https://www.rawpixel.com/image/3322326/free-photo-image-technology-electronics-data

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Home User Qualifications Work Hobbies Projects Skills Skills To Projects Comments Ratings Images Main Site ▾					
List (4) Create With selected ▾					
<input type="checkbox"/>		Author	Title	Content	Repo Link
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	Online Digital Portfolio	I created an online digital portfolio for my MSc Computing Course at Cardiff University. This was my first significant MVC web app, which I thoroughly enjoyed developing. Although it was challenging at first, I greatly enjoyed stretching myself to finish it, and hopefully you have enjoyed using it!	<a href="https://github.com/james-tapp/CMT120-2">https://github.com/james-tapp/CMT120-2</a>
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	Console Battleships App	This is an application which allows the user to play the game battleships in the command line. This was one of the first serious projects I did when learning to code. I really enjoyed allowing the user to choose their own number of battleship and grid size, although this project is no longer representative of my python skills.	<a href="https://github.com/james-tapp/battleshipsProject">https://github.com/james-tapp/battleshipsProject</a>
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	Iowa Home Prices App	This is a machine learning program which predicts house prices given a set of input parameters. This was developed using R and R Shiny, and utilises my skills in mathematics by using the K-nearest neighbour algorithm and a training dataset. Part of this project also involved hosting it on google cloud platform for the user.	<a href="https://github.com/james-tapp/iowaHomesProject">https://github.com/james-tapp/iowaHomesProject</a>
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	Computational Thinking Assessment	This is a project for a module in Computational Thinking for my MSc Computing course. For this project I wrote the HTML and CSS for a website indicating my understanding of computational thinking as a higher concept, and a short biography of a computer scientist. I enjoyed getting to use CSS and understand the higher concepts in greater detail during this project, which has served me well since.	<a href="https://github.com/james-tapp/CMT119">https://github.com/james-tapp/CMT119</a>





DigitalPortfolio					
Home User Qualifications Work Hobbies Projects Skills Skills To Projects Comments Ratings Images Main Site ▾					
List (9) Create With selected ▾					
<input type="checkbox"/>		Author	Skill		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	Python		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	HTML		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	Data Science		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	Flask		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	GCP		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	R		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	R Shiny		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	CSS		
<input type="checkbox"/>	 	User('adminuser', 'alexandertapp@gmail.com')	Javascript		

DigitalPortfolio					
Home User Qualifications Work Hobbies Projects Skills Skills To Projects Comments Ratings Images Main Site ▾					
List (11) Create With selected ▾					
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<input type="checkbox"/>	 	Project('1', 'Online Digital Portfolio', '1')	Skill('2', 'HTML', '1')		
<input type="checkbox"/>	 	Project('1', 'Online Digital Portfolio', '1')	Skill('4', 'Flask', '1')		
<input type="checkbox"/>	 	Project('1', 'Online Digital Portfolio', '1')	Skill('6', 'CSS', '1')		
<input type="checkbox"/>	 	Project('1', 'Online Digital Portfolio', '1')	Skill('9', 'Javascript', '1')		
<input type="checkbox"/>	 	Project('2', 'Console Battleships App', '1')	Skill('1', 'Python', '1')		
<input type="checkbox"/>	 	Project('3', 'Iowa Home Prices App', '1')	Skill('6', 'R', '1')		
<input type="checkbox"/>	 	Project('3', 'Iowa Home Prices App', '1')	Skill('7', 'R Shiny', '1')		
<input type="checkbox"/>	 	Project('3', 'Iowa Home Prices App', '1')	Skill('3', 'Data Science', '1')		
<input type="checkbox"/>	 	Project('4', 'Computational Thinking Assessment', '1')	Skill('2', 'HTML', '1')		
<input type="checkbox"/>	 	Project('4', 'Computational Thinking Assessment', '1')	Skill('8', 'CSS', '1')		

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List (2)CreateWith selected ▾

<input type="checkbox"/>	Author	Page	Page Id	Comment	Comment Time
<input type="checkbox"/>	  User('adminuser', 'alexandertapp@gmail.com')	qualifications		I rate myself 10/10!	2023-01-20 19:47:56
<input type="checkbox"/>	  User('adminuser', 'alexandertapp@gmail.com')	work	2	I rate myself 11/10	2023-01-20 19:47:56

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List (2)CreateWith selected ▾

<input type="checkbox"/>	Author	Page	Page Id	Rating
<input type="checkbox"/>	  User('adminuser', 'alexandertapp@gmail.com')	qualifications		10
<input type="checkbox"/>	  User('adminuser', 'alexandertapp@gmail.com')	work		10

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Use this page to upload and delete images.

Image Upload

Choose FileNo file chosen

Submit

Remove File

Lindy\_hop.jpg ▾

Submit

## References:

In addition to the below references, I made use of an API at <https://official-joke-api.appspot.com/jokes/programming/random> in order to tell the user a random programming joke on the user dashboard.

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