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Discussion (618 words)

NASA requires a highly secure and scalable prototype, considering all three security tenets of the CIA triad. Input sanitisation has been considered, and the system is consistent with PEP8 formatting.

The prototype differs from the original design in the following ways:

It was decided that the `smtplib` library was not required due to using a one-time-password (OTP) as it was deemed more secure (Thales, N.D.). OTPs provide an additional layer of security by introducing multifactor authentication (MFA), requiring something you have as well as something you know. This exponentially decreases the chance of a user account being compromised as they will need to have access to the device as well as the secret. The QR code used to register a new user must be sent by the admin, separately to the user (Grinberg, 2015).

Another benefit of using MFA is that the lockout / unlock functions originally designed were also deemed unnecessary. However, it could still have been implemented in a more complete version of the software to provide additional security. Brute force and (D)DoS attacks could also be prevented by using network-level security methods, such as a web application firewall (WAF).

Initially, the application was designed so that users would initially create their own user account, which would then need to be verified by an administrator. This allows anyone with access to the application to create their own user account, and potentially a mistake by the admin's onboarding processes could mean the rogue user would have access to substantial amounts of sensitive data. To follow industry recognised practices, it was deemed that the admins should create the user accounts.

Admins also had the right to delete users removed, following best practice guidelines, and enabling users to be reactivated in the future should they need to be, while still prohibiting their access to the system. An extension to the prototype could be to additionally offer a delete function, tied to a company policy to purge them after one year of inactivity, for example.

User notification of changes was also deemed unnecessary due to users having continuous access to their own data and being internal employees, rather than customers or clients. If there would be a reason for NASA to incorporate an interface which would be accessible to the external public, and would therefore their data, then the prototype could include an extended functionality to send email updates to these users whenever changes were made in order to satisfy GDPR.

The attributes of the user and document classes changed considerably. The original "phone" field in the user table was dropped to reduce the attack surface and was already deemed redundant data serving no use to the project. The need for two name fields ("firstName" and "lastName") was also deemed unnecessary for a prototype, and so was consolidated into one. However, this could be extended if more granularity was desired for future iterations. The user table also included an additional "otp_secret" field to accommodate the OTP function.

The document class also had some changes. The "data" field was introduced to rectify the original oversight that we needed somewhere to store the data binary. The "role" field (originally classification) was changed to an "enum" data type in order to be matched to the role of a user. This was a better idea than the original 'clearance' style classification field which was due to be used and enabled an easier way to share files. Finally, the "key" field is generated once the file is uploaded, combined

with the server master key to encrypt, or decrypt the stored files by "MultiFernet".

The master key can change after a period of time.

Testing was consistent with what was originally designed and was carried out extensively.

Modules, Libraries and Prerequisites

The application is built using Flask (The Pallets Projects, N.D.), and the authors assume the user has an internet connection and Python3 installed on their local system.

The following modules and libraries are imported into the program by running **pip3 install -r requirements.txt** from the command line:

Web App

- flask
- flask_sqlalchemy
- flask_login
- werkzeug
- cryptography
- pyaml-env
- pymysql
- pytz
- PyQRCode~=1.2.1
- onetimepass~=1.0.1

Testing

- flake8
- pylint
- pytest

Database

An SQL database has been provided by phpMyAdmin (N.D.) and can be found at:

<https://www.phpmyadmin.co>. The create table query can be found in Appendix A.







Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G
 id	INT(5)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 email	VARCHAR(100)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 password	VARCHAR(100)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 name	VARCHAR(50)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 role	ENUM('ISS', 'Ground Staff', 'Government', 'Admin', 'Disabled')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 otp_secret	VARCHAR(16)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1: user table








Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G
 fileid	INT(11)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 filename	VARCHAR(50)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 data	MEDIUMBLOB	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 role	ENUM('ISS', 'Ground Staff', 'Government', 'Admin', 'Disabled')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 key	VARCHAR(50)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 timestamp	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 owner	VARCHAR(50)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 2: document table

File Tree

```
File Tree
+---client                                     # User file library system
|   .gitignore                               # Specifies untracked files
|   access.log                               # Web access log
|   auth.py                                 # Authentication code
|   main.py                                 # Main code
|   models.py                              # Definitive source of Database
|   README.md                               # Instructions text
|   requirements.txt                         # Python requirement
|   __init__.py                             # App Init
|
+---config
|   config.yml                               # Configuration file (Should saved in System Environment variables)
|
+---keystore                                  # Server key and certificate (Should saved in System Keystore)
|   cert.pem
|   key.pem
|
+---pytest                                   # Pytest for admin and client pages
|   admin.py
|   client.py
|
+---templates                                # Web templates
|   base.html                               # Base page for all html pages
|   download.html                           # File Download page
|   index.html                              # Index page
|   login.html                              # Login page
|   profile.html                            # User profile page
|   remove.html                             # File removal page
|   upload.html                             # File upload page
|
+---admin                                    # Admin user management system
|   |   access.log                           # Web access log
|   |   auth.py                             # Authentication code
|   |   main.py                             # Main code
|   |   models.py                           # Definitive source of Database
|   |   __init__.py                         # App Init
|   |
|   +---config
|   |   config.yml                           # Configuration file (Should saved in System Environment variables)
|   |
|   +---keystore                             # Server key and certificate (Should saved in System Keystore)
|   |   cert.pem
|   |   key.pem
|   |
|   +---templates                            # Web templates
|   |   base.html                           # Base page for all html pages
|   |   create.html                         # Create user page
|   |   index.html                          # Index page
|   |   login.html                          # Login page
|   |   profile.html                        # User profile page
|   |   two-factor-setup.html                # Two-factor QR code generate page (Should send to user email instead)
|   |   update.html                         # Index page
```

Figure 3: File tree and comments

End User Instructions

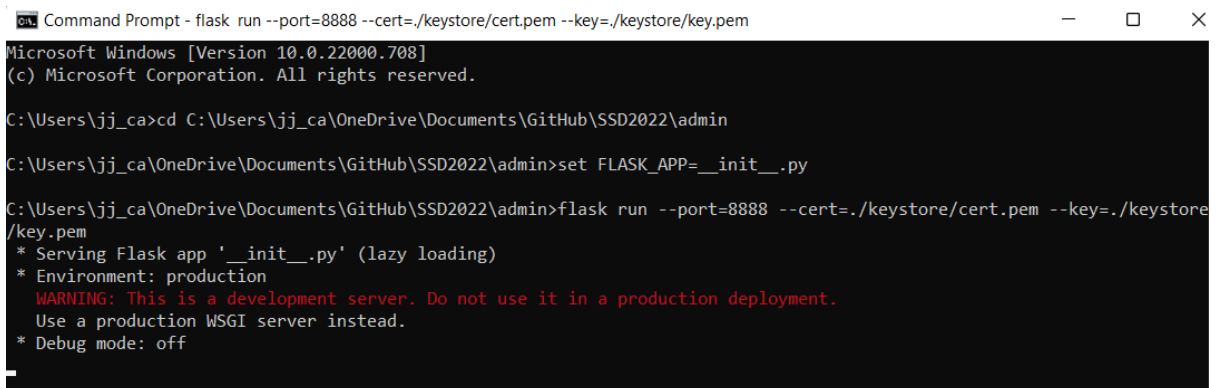
The system has two interfaces. One for admins to create and update user accounts, and one for users to upload, download, and remove documents.

Admin:

Setup

Download the application from <https://github.com/ychan2020/SSD2022.git> and run it in the downloaded directory **admin** folder.

1. In the Command Line Interface (CLI), cd [downloaded directory path]\admin



```
Command Prompt - flask run --port=8888 --cert=./keystore/cert.pem --key=./keystore/key.pem
Microsoft Windows [Version 10.0.22000.708]
(c) Microsoft Corporation. All rights reserved.

C:\Users\jj_ca>cd C:\Users\jj_ca\OneDrive\Documents\GitHub\SSD2022\admin

C:\Users\jj_ca\OneDrive\Documents\GitHub\SSD2022\admin>set FLASK_APP=__init__.py

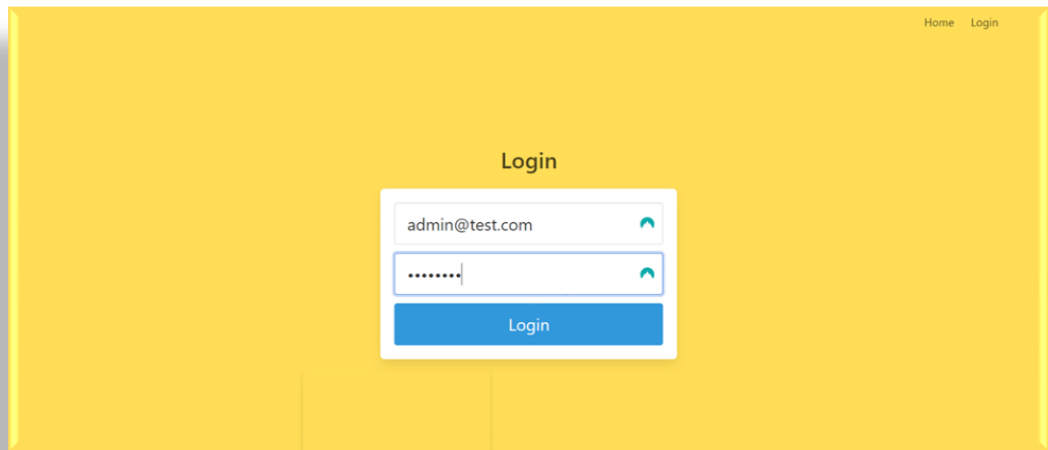
C:\Users\jj_ca\OneDrive\Documents\GitHub\SSD2022\admin>flask run --port=8888 --cert=./keystore/cert.pem --key=./keystore/key.pem
* Serving Flask app '__init__.py' (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: off
```

Figure 4: Running application

2. Set FLASK_APP=__init__.py (Windows) or Set FLASK_APP=__init__.py (Linux)
3. flask run --port=8888 --cert=./keystore/cert.pem --key=./keystore/key.pem
4. Open the Admin page <https://localhost:8888/>

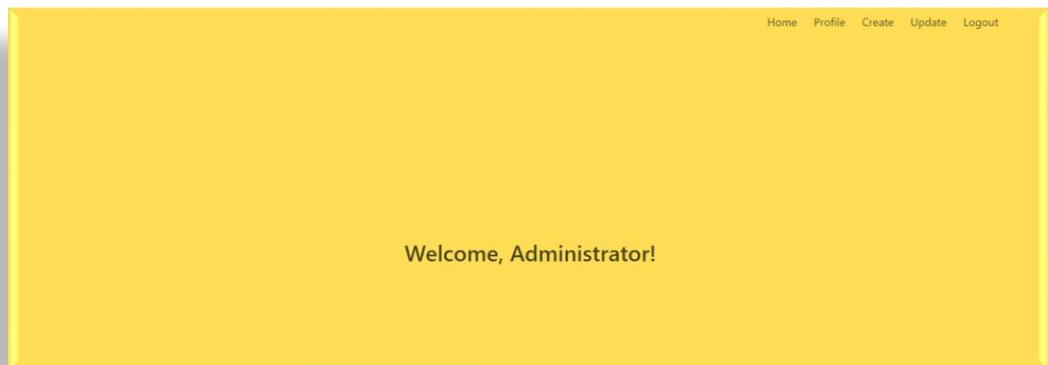
Login

1. On the webpage, enter the Admin email username: admin@test.com
2. The default password: P@ssw0rd
3. Press Login



A screenshot of a web application's login page. The page has a solid yellow background. In the top right corner, there are two small, faint links: "Home" and "Login". Centered on the page is a white login form with a blue border. The form has a title "Login" in bold black text. Below the title are two input fields: the first contains the text "admin@test.com" and the second contains a series of dots representing a masked password. Each input field has a small blue eye icon to its right. Below the input fields is a blue button with the text "Login" in white.

Figure 5: Login page



A screenshot of a web application's welcome page. The page has a solid yellow background. In the top right corner, there are five small, faint links: "Home", "Profile", "Create", "Update", and "Logout". Centered on the page is the text "Welcome, Administrator!" in bold black font.

Figure 6: Welcome page

Create User

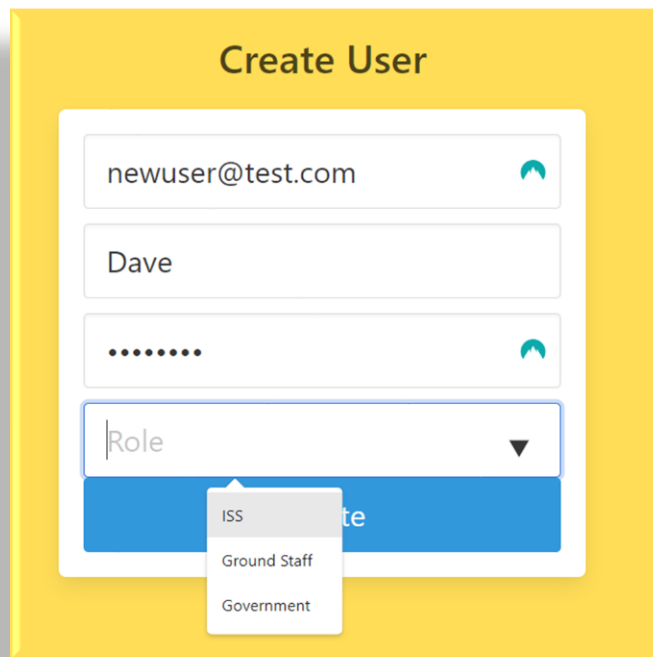
1. Select 'Create' in the top right of the screen and enter the new user's email, name, password, and role. Roles can be defined as:

 'ISS'

 'Ground staff'

 'Government'
2. Click the blue 'Create' button.
3. Send QR code securely to user
4. Install FreeOTP app on user's device
 - Android:

 <https://play.google.com/store/apps/details?hl=en&id=org.fedorahosted.freeotp>
 - iOS: <https://apps.apple.com/us/app/freeotp-authenticator/id872559395>
5. Scan the generated QR code for OTP and two-factor authentication for the newly created user. Most recognised OTP apps are supported, however we recommend the use of FreeOTP:



The 'Create User' page features a yellow background with a white form. The form contains four input fields: an email field with 'newuser@test.com', a name field with 'Dave', a password field with seven dots, and a role dropdown menu. The dropdown menu is open, showing three options: 'ISS' (highlighted), 'Ground Staff', and 'Government'. A blue button with the text 'Create User' is positioned below the role dropdown.

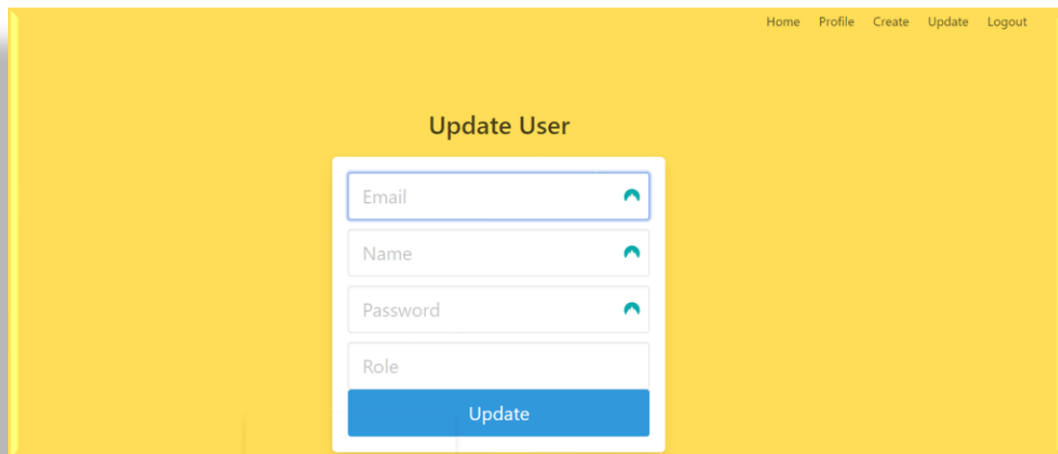
Figure 7: Create User page



Figure 8: OTP initialisation

Update User

1. Click 'Update'.
2. Amend the necessary information
3. Click the blue 'Update' button.



The screenshot shows a web application with a yellow background. At the top right, there is a navigation menu with links: Home, Profile, Create, Update, and Logout. In the center, there is a white box titled "Update User". Inside this box, there are four input fields: "Email", "Name", "Password", and "Role". Each input field has a small blue icon on the right side. Below the input fields is a blue button labeled "Update".

Logout

1. Click 'Logout' from the user menu.

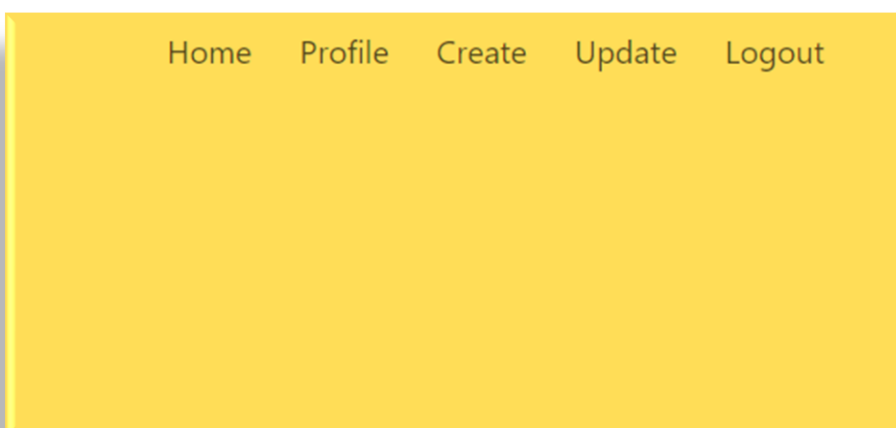


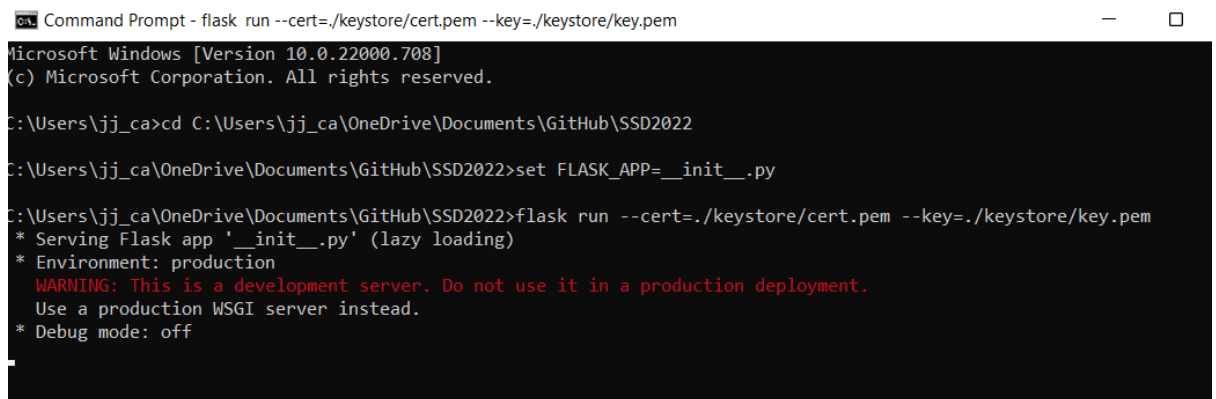
Figure 9: Admin menu

User:

Setup

Download the application from <https://github.com/ychan2020/SSD2022.git> and run it in the downloaded directory

1. In the CLI, cd [downloaded directory path]



```
Command Prompt - flask run --cert=./keystore/cert.pem --key=./keystore/key.pem
Microsoft Windows [Version 10.0.22000.708]
(c) Microsoft Corporation. All rights reserved.

C:\Users\jj_ca>cd C:\Users\jj_ca\OneDrive\Documents\GitHub\SSD2022

C:\Users\jj_ca\OneDrive\Documents\GitHub\SSD2022>set FLASK_APP=__init__.py

C:\Users\jj_ca\OneDrive\Documents\GitHub\SSD2022>flask run --cert=./keystore/cert.pem --key=./keystore/key.pem
* Serving Flask app '__init__.py' (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: off
```

Figure 10: Running application

2. Set FLASK_APP=__init__.py (Windows) or export FLASK_APP=__init__.py (Linux)
3. flask run --cert=./keystore/cert.pem --key=./keystore/key.pem
4. Open the Client page <https://localhost:5000/>

Login

1. On the webpage, enter the email, password and OTP (FreeOTP).

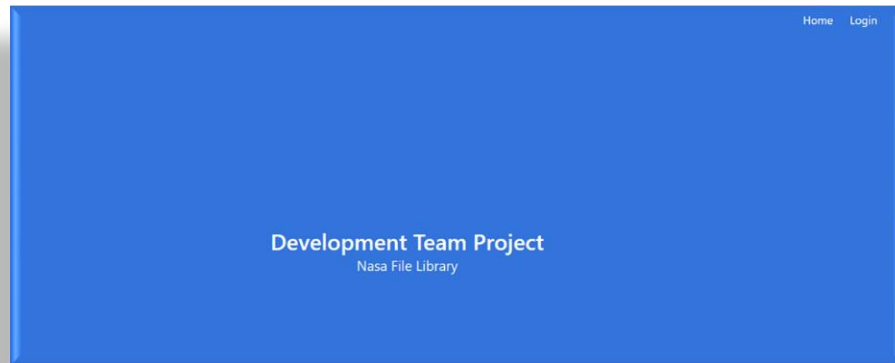


Figure 11: Welcome page

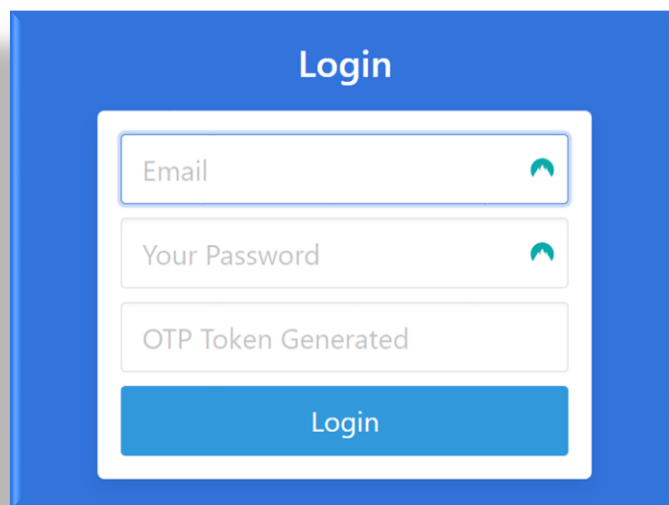
A screenshot of a login page with a blue background. At the top center, the word "Login" is written in white. Below it is a white rectangular box containing four input fields and a button. The first field is labeled "Email", the second "Your Password", and the third "OTP Token Generated". Each of the first two fields has a small green eye icon on its right side. At the bottom of the white box is a blue button with the word "Login" in white text.

Figure 12: Login page

Change Password

1. Navigate to 'Profile'.
2. Enter a new password and click 'Change Password' (optional).

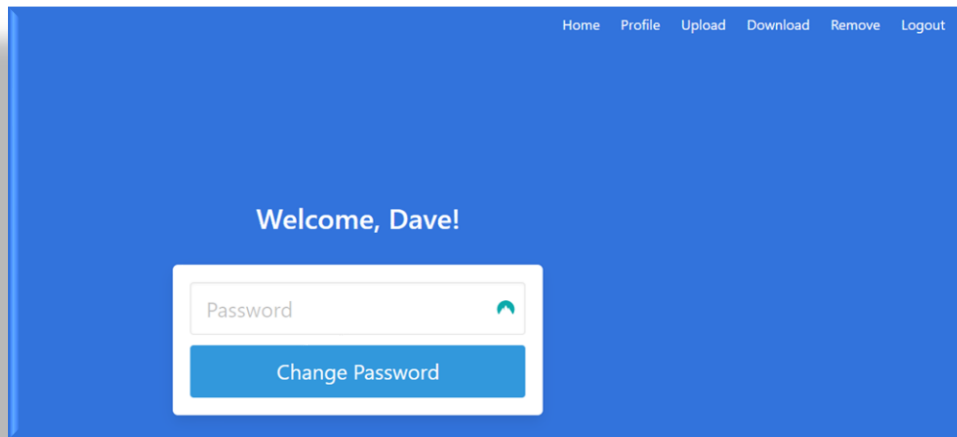


Figure 13: Change Password

Upload File

1. Navigate to 'Upload'.
2. Click 'Choose File' to be prompted to select a file to upload.
3. Click the blue button 'Upload'.

Home Profile Upload Download Remove Logout

Upload

Choose File No file chosen

Role

Upload

Figure 14: Upload File

Download File

1. Navigate to 'Download'.
2. View the list of files available due to privilege.
3. Select a File ID and click the blue button 'Download'.

Home Profile Upload Download Remove Logout

List of Files

This is a list of all the file available for you.

File ID	File Name	Upload date (UTC)	Owner
43	Confidential_text.txt	2022-06-08 15:29:56	User3
44	Confidential_text.txt	2022-06-08 07:34:07	User3
46	Confidential_text.txt	2022-06-08 07:57:11	User3
47	Confidential_text.txt	2022-06-08 08:41:23	User3
49	ISS document V2.1.docx	2022-06-08 14:09:14	Sarah
50	Confidential_text.txt	2022-06-09 06:30:32	ISSStaff
55	Mars_Campaign.jpg	2022-06-11 18:20:21	iss@test.com

Download

File ID

Download

Figure 15: Download File

Remove a file

1. Navigate to 'Remove'.
2. View the list of files available due to privilege.
3. Select a File ID and click the blue button 'Remove'.

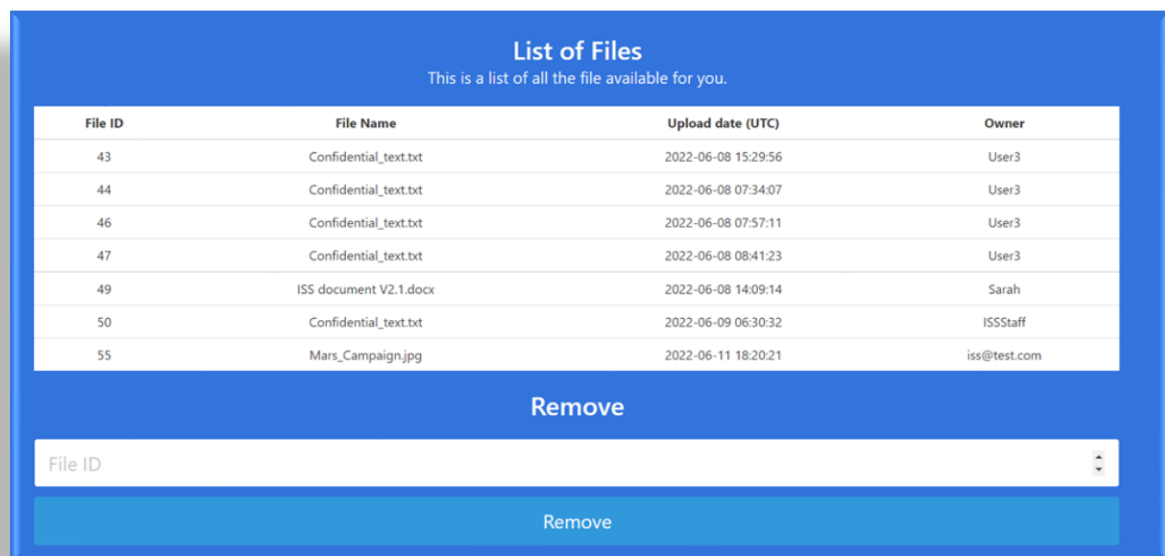


Figure 16: Remove File

Logout

1. Click 'Logout' from the user menu.

Testing

Pylint and Flake8 testing for both user and admin interfaces was carried out at various stages of program development, and evidence can be found in Appendix B.

Code and functionality testing was also carried out, evidence of which can be found in Appendix C.

References

Grinberg, M. (2015) Factor Authentication with Flask. [online]

blog.miguelgrinberg.com. Available from: <https://blog.miguelgrinberg.com/post/two-factor-authentication-with-flask> [Accessed 02 June 2022]

phpMyAdmin. (N.D.) Available from: <https://www.phpmyadmin.co> [Accessed 06 June 2022].

Thales. (N.D.) One Time Password (OTP, TOTP) : definition, examples. Available from: <https://www.thalesgroup.com/en/markets/digital-identity-and-security/technology/otp> [Accessed 12 June 2022].

The Pallets Projects. (N.D.) Flask. Available from: <https://palletsprojects.com/p/flask> [Accessed 08 June 2022].

Appendices

APPENDIX A: Database SQL

```
CREATE TABLE `document` (  
  `fileid` int(11) NOT NULL AUTO_INCREMENT,  
  `filename` varchar(50) NOT NULL,  
  `data` mediumblob NOT NULL,  
  `role` enum('ISS','Ground Staff','Government','Admin','Disabled') NOT NULL,  
  `key` varchar(50) NOT NULL,  
  `timestamp` datetime NOT NULL,  
  `owner` varchar(50) NOT NULL,  
  PRIMARY KEY (`fileid`)  
)  
  
CREATE TABLE `user` (  
  `id` int(5) NOT NULL AUTO_INCREMENT,  
  `email` varchar(100) NOT NULL,  
  `password` varchar(100) NOT NULL,  
  `name` varchar(50) NOT NULL,  
  `role` enum('ISS','Ground Staff','Government','Admin','Disabled') NOT NULL,  
  `otp_secret` varchar(16) NOT NULL,  
  PRIMARY KEY (`id`),  
  UNIQUE KEY `email` (`email`)  
)
```

Figure 17: Database Creation SQL Query

APPENDIX B: Pylint and Flake8 Testing

User interface

07 June 2022:

```
(auth) C:\Users\Richard\SSD2022-main>pylint __init__.py
***** Module SSD2022-main
__init__.py:1:0: C0103: Module name "SSD2022-main" doesn't conform to snake_case naming style (invalid-name)
__init__.py:23:31: E1101: Instance of 'BaseConfig' has no 'init' member (no-member)
__init__.py:24:44: E1101: Instance of 'BaseConfig' has no 'init' member (no-member)

-----
Your code has been rated at 5.22/10 (previous run: 3.91/10, +1.30)

(auth) C:\Users\Richard\SSD2022-main>
```

Figure 18: `__init__.py`

```

(auth) C:\Users\Richard\SSD2022-main>pylint main.py
***** Module SSD2022-main.main
main.py:46:4: E1101: Instance of 'scoped_session' has no 'add' member (no-member)
main.py:47:4: E1101: Instance of 'scoped_session' has no 'commit' member (no-member)
main.py:9:0: C0411: standard import "from io import BytesIO" should be placed before "from flask import Blueprint, render_template, request, send_file, flash" (wrong-import-order)
main.py:10:0: C0411: third party import "from cryptography.fernet import Fernet" should be placed before "from .models import Document" (wrong-import-order)

-----
Your code has been rated at 6.36/10 (previous run: 10.00/10, -3.64)

(auth) C:\Users\Richard\SSD2022-main>pylint auth.py
***** Module SSD2022-main.auth
auth.py:59:4: E1101: Instance of 'scoped_session' has no 'add' member (no-member)
auth.py:60:4: E1101: Instance of 'scoped_session' has no 'commit' member (no-member)

-----
Your code has been rated at 7.06/10 (previous run: 9.13/10, -2.07)

(auth) C:\Users\Richard\SSD2022-main>flake8 main.py
main.py:26:80: E501 line too long (92 > 79 characters)
main.py:45:80: E501 line too long (95 > 79 characters)
main.py:55:80: E501 line too long (81 > 79 characters)
main.py:56:80: E501 line too long (96 > 79 characters)
main.py:67:80: E501 line too long (100 > 79 characters)

(auth) C:\Users\Richard\SSD2022-main>flake8 auth.py
auth.py:29:80: E501 line too long (97 > 79 characters)
auth.py:32:80: E501 line too long (97 > 79 characters)
auth.py:36:80: E501 line too long (81 > 79 characters)
auth.py:38:80: E501 line too long (80 > 79 characters)
auth.py:42:1: E302 expected 2 blank lines, found 1
auth.py:53:80: E501 line too long (83 > 79 characters)
auth.py:56:80: E501 line too long (84 > 79 characters)
auth.py:65:1: E302 expected 2 blank lines, found 1

(auth) C:\Users\Richard\SSD2022-main>

```

Figure 19: auth.py and main.py

```

(auth) C:\Users\Richard\SSD2022-main>flake8 'FileListing.py'
'FileListing.py':0:1: E902 FileNotFoundError: [Errno 2] No such file or directory: "'FileListing.py'"

(auth) C:\Users\Richard\SSD2022-main>flake8 FileListing.py
FileListing.py:1:80: E501 line too long (156 > 79 characters)
FileListing.py:10:1: F811 redefinition of unused 'db' from line 3
FileListing.py:18:80: E501 line too long (84 > 79 characters)
FileListing.py:31:1: E402 module level import not at top of file
FileListing.py:33:1: E265 block comment should start with '#'
FileListing.py:35:1: E302 expected 2 blank lines, found 1
FileListing.py:38:80: E501 line too long (130 > 79 characters)
FileListing.py:38:81: E251 unexpected spaces around keyword / parameter equals
FileListing.py:38:83: E251 unexpected spaces around keyword / parameter equals
FileListing.py:41:33: E222 multiple spaces after operator
FileListing.py:50:1: E305 expected 2 blank lines after class or function definition, found 1
FileListing.py:51:24: W292 no newline at end of file

(auth) C:\Users\Richard\SSD2022-main>

(auth) C:\Users\Richard\SSD2022-main>pylint FileListing.py
***** Module SSD2022-main.FileListing
FileListing.py:1:0: C0301: Line too long (156/100) (line-too-long)
FileListing.py:38:0: C0301: Line too long (130/100) (line-too-long)
FileListing.py:51:0: C0304: Final newline missing (missing-final-newline)
FileListing.py:1:0: C0103: Module name "FileListing" doesn't conform to snake_case naming style (invalid-name)
FileListing.py:14:0: C0103: Constant name "db_name" doesn't conform to UPPER_CASE naming style (invalid-name)
FileListing.py:31:0: C0413: Import "from .models import Document_repository" should be placed at the top of the module (wrong-import-position)
FileListing.py:36:0: C0116: Missing function or method docstring (missing-function-docstring)
FileListing.py:44:11: W0703: Catching too general exception Exception (broad-except)
FileListing.py:44:4: C0103: Variable name "e" doesn't conform to snake_case naming style (invalid-name)
FileListing.py:4:0: C0411: third party import "from flask import Flask" should be placed before "from . import db" (wrong-import-order)
FileListing.py:5:0: C0411: third party import "from flask_sqlalchemy import SQLAlchemy" should be placed before "from . import db" (wrong-import-order)

-----
Your code has been rated at 5.77/10

```

Figure 20: File Listing.py (prototype)

```
Command Prompt
***** Module SSD2022-main.models
models.py:12:9: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:12:19: E1101: Instance of 'SQLAlchemy' has no 'Integer' member (no-member)
models.py:13:12: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:13:22: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:14:15: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:14:25: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:15:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:15:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:16:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:16:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:22:13: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:22:23: E1101: Instance of 'SQLAlchemy' has no 'Integer' member (no-member)
models.py:23:15: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:23:25: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:24:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:24:21: E1101: Instance of 'SQLAlchemy' has no 'LargeBinary' member (no-member)
models.py:25:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:25:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:26:10: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:26:20: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:19:0: R0903: Too few public methods (0/2) (too-few-public-methods)

-----
Your code has been rated at 0.00/10 (previous run: 0.00/10, +0.00)

C:\Users\Richard\SSD2022-main>flake8 models.py

C:\Users\Richard\SSD2022-main>
```

Figure 21: models.py


```

(auth) C:\Users\Richard\SSD2022-main>pylint routes.py
***** Module SSD2022-main.routes
routes.py:22:9: C0303: Trailing whitespace (trailing-whitespace)
routes.py:36:0: C0303: Trailing whitespace (trailing-whitespace)
routes.py:41:0: C0304: Final newline missing (missing-final-newline)
routes.py:1:0: C0114: Missing module docstring (missing-module-docstring)
routes.py:3:0: E0401: Unable to import 'SSD2022-main.models_docs' (import-error)
routes.py:15:11: E0602: Undefined variable 'existing_docs' (undefined-variable)
routes.py:26:8: E0602: Undefined variable 'redirect' (undefined-variable)
routes.py:26:17: E0602: Undefined variable 'url_for' (undefined-variable)
routes.py:12:8: W0612: Unused variable 'existing_doc' (unused-variable)

-----
Your code has been rated at 0.00/10

(auth) C:\Users\Richard\SSD2022-main>flake8 routes.py
routes.py:12:9: F841 local variable 'existing_doc' is assigned to but never used
routes.py:15:12: F821 undefined name 'existing_docs'
routes.py:22:10: W291 trailing whitespace
routes.py:23:8: E114 indentation is not a multiple of 4 (comment)
routes.py:26:9: F821 undefined name 'redirect'
routes.py:26:18: F821 undefined name 'url_for'
routes.py:33:1: E302 expected 2 blank lines, found 1
routes.py:36:1: W293 blank line contains whitespace
routes.py:41:6: W292 no newline at end of file

(auth) C:\Users\Richard\SSD2022-main>

```

Figure 22: routes.py (not used in the final program)

```

(auth) C:\Users\Richard\SSD2022-main>pylint sqltest.py
***** Module SSD2022-main.sqltest
sqltest.py:13:0: C0301: Line too long (120/100) (line-too-long)
sqltest.py:31:0: C0304: Final newline missing (missing-final-newline)
sqltest.py:18:0: C0116: Missing function or method docstring (missing-function-docstring)

-----
Your code has been rated at 7.86/10 (previous run: 7.14/10, +0.71)

(auth) C:\Users\Richard\SSD2022-main>flake8 sqltest.py
sqltest.py:13:80: E501 line too long (120 > 79 characters)
sqltest.py:17:1: E302 expected 2 blank lines, found 1
sqltest.py:31:14: W292 no newline at end of file

(auth) C:\Users\Richard\SSD2022-main>

```

Figure 23: *sqltest.py* (DB connection test file)

10 June 2022:

```

(auth) C:\Users\Richard\SSD2022-main>pylint __init__.py
***** Module SSD2022-main
__init__.py:1:0: C0103: Module name "SSD2022-main" doesn't conform to snake_case naming style (invalid-name)
__init__.py:20:31: E1101: Instance of 'BaseConfig' has no 'init' member (no-member)
__init__.py:21:44: E1101: Instance of 'BaseConfig' has no 'init' member (no-member)
__init__.py:25:4: C0415: Import outside toplevel (models.User) (import-outside-toplevel)
__init__.py:37:4: C0415: Import outside toplevel (auth.auth) (import-outside-toplevel)
__init__.py:41:4: C0415: Import outside toplevel (main.main) (import-outside-toplevel)

-----
Your code has been rated at 3.91/10

(auth) C:\Users\Richard\SSD2022-main>flake8 __init__.py
(auth) C:\Users\Richard\SSD2022-main>

```

Figure 24: *__init__.py*

```

(auth) C:\Users\Richard\SSD2022-main>pylint auth.py
***** Module SSD2022-main.auth
auth.py:29:0: C0301: Line too long (115/100) (line-too-long)
auth.py:30:0: C0301: Line too long (121/100) (line-too-long)
auth.py:32:0: C0301: Line too long (116/100) (line-too-long)
auth.py:33:0: C0301: Line too long (117/100) (line-too-long)
auth.py:34:0: C0301: Line too long (112/100) (line-too-long)
auth.py:35:0: C0301: Line too long (111/100) (line-too-long)
auth.py:47:0: C0303: Trailing whitespace (trailing-whitespace)
auth.py:52:0: C0301: Line too long (120/100) (line-too-long)
auth.py:21:0: C0116: Missing function or method docstring (missing-function-docstring)
auth.py:89:4: E1101: Instance of 'scoped_session' has no 'add' member (no-member)
auth.py:90:4: E1101: Instance of 'scoped_session' has no 'commit' member (no-member)

-----
Your code has been rated at 5.87/10 (previous run: 5.87/10, +0.00)

(auth) C:\Users\Richard\SSD2022-main>flake8 auth.py
auth.py:28:80: E501 line too long (85 > 79 characters)
auth.py:29:80: E501 line too long (115 > 79 characters)
auth.py:30:80: E501 line too long (121 > 79 characters)
auth.py:31:80: E501 line too long (93 > 79 characters)
auth.py:32:80: E501 line too long (116 > 79 characters)
auth.py:33:80: E501 line too long (117 > 79 characters)
auth.py:34:80: E501 line too long (112 > 79 characters)
auth.py:35:80: E501 line too long (111 > 79 characters)
auth.py:47:1: W293 blank line contains whitespace
auth.py:51:80: E501 line too long (95 > 79 characters)
auth.py:52:80: E501 line too long (120 > 79 characters)
auth.py:86:80: E501 line too long (84 > 79 characters)

(auth) C:\Users\Richard\SSD2022-main>

```

Figure 25: auth.py

```

(auth) C:\Users\Richard\SSD2022-main>pylint main.py
***** Module SSD2022-main.main
main.py:35:0: C0301: Line too long (115/100) (line-too-long)
main.py:36:0: C0301: Line too long (121/100) (line-too-long)
main.py:38:0: C0301: Line too long (116/100) (line-too-long)
main.py:39:0: C0301: Line too long (117/100) (line-too-long)
main.py:40:0: C0301: Line too long (112/100) (line-too-long)
main.py:41:0: C0301: Line too long (111/100) (line-too-long)
main.py:27:0: C0116: Missing function or method docstring (missing-function-docstring)
main.py:71:24: E1101: Instance of 'BaseConfig' has no 'file' member (no-member)
main.py:77:4: E1101: Instance of 'scoped_session' has no 'add' member (no-member)
main.py:78:4: E1101: Instance of 'scoped_session' has no 'commit' member (no-member)
main.py:104:24: E1101: Instance of 'BaseConfig' has no 'file' member (no-member)
main.py:9:0: C0411: standard import "from io import BytesIO" should be placed before "from flask import Blueprint, render_template, request, send_file, flash, redirect, url_for" (wrong-import-order)
main.py:10:0: C0411: third party import "from cryptography.fernet import Fernet, MultiFernet" should be placed before "from .models import Document" (wrong-import-order)
main.py:11:0: C0411: third party import "from pyaml_env import parse_config, BaseConfig" should be placed before "from .models import Document" (wrong-import-order)
main.py:12:0: C0411: third party import "import pytz" should be placed before "from .models import Document" (wrong-import-order)
main.py:13:0: C0411: standard import "import datetime" should be placed before "from flask import Blueprint, render_template, request, send_file, flash, redirect, url_for" (wrong-import-order)

-----
Your code has been rated at 4.39/10 (previous run: 4.39/10, +0.00)

(auth) C:\Users\Richard\SSD2022-main>flake8 main.py
main.py:5:80: E501 line too long (90 > 79 characters)
main.py:34:80: E501 line too long (85 > 79 characters)
main.py:35:80: E501 line too long (115 > 79 characters)
main.py:36:80: E501 line too long (121 > 79 characters)
main.py:37:80: E501 line too long (93 > 79 characters)
main.py:38:80: E501 line too long (116 > 79 characters)
main.py:39:80: E501 line too long (117 > 79 characters)
main.py:40:80: E501 line too long (112 > 79 characters)
main.py:41:80: E501 line too long (111 > 79 characters)
main.py:76:80: E501 line too long (91 > 79 characters)
main.py:87:80: E501 line too long (81 > 79 characters)
main.py:88:80: E501 line too long (96 > 79 characters)
main.py:97:80: E501 line too long (92 > 79 characters)
main.py:107:80: E501 line too long (100 > 79 characters)

(auth) C:\Users\Richard\SSD2022-main>

```

Figure 26: main.py

```

(auth) C:\Users\Richard\SSD2022-main>pylint models.py
***** Module SSD2022-main.models
models.py:17:41: C0303: Trailing whitespace (trailing-whitespace)
models.py:34:0: C0303: Trailing whitespace (trailing-whitespace)
models.py:12:9: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:12:19: E1101: Instance of 'SQLAlchemy' has no 'Integer' member (no-member)
models.py:13:12: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:13:22: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:14:15: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:14:25: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:15:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:15:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:16:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:16:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:17:17: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:17:27: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:27:13: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:27:23: E1101: Instance of 'SQLAlchemy' has no 'Integer' member (no-member)
models.py:28:15: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:28:25: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:29:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:29:21: E1101: Instance of 'SQLAlchemy' has no 'LargeBinary' member (no-member)
models.py:30:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:30:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:31:10: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:31:20: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:32:16: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:32:26: E1101: Instance of 'SQLAlchemy' has no 'DateTime' member (no-member)
models.py:33:12: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:33:22: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:24:0: R0903: Too few public methods (0/2) (too-few-public-methods)

-----
Your code has been rated at 0.00/10

(auth) C:\Users\Richard\SSD2022-main>flake8 models.py
models.py:17:42: W291 trailing whitespace
models.py:24:1: E302 expected 2 blank lines, found 1
models.py:34:1: W293 blank line contains whitespace

(auth) C:\Users\Richard\SSD2022-main>_

```

Figure 27: models.py

13 June 2022:

```
D:\ssd2022>pylint __init__.py
***** Module ssd2022
__init__.py:40:4: C0415: Import outside toplevel (models.User) (import-outside-toplevel)
__init__.py:52:4: C0415: Import outside toplevel (auth.auth) (import-outside-toplevel)
__init__.py:56:4: C0415: Import outside toplevel (main.main) (import-outside-toplevel)

-----
Your code has been rated at 9.06/10 (previous run: 7.50/10, +1.56)

D:\ssd2022>flake8 __init__.py
__init__.py:20:80: E501 line too long (80 > 79 characters)
```

Figure 28: `__init__.py`

```
D:\ssd2022>pylint auth.py

-----
Your code has been rated at 10.00/10 (previous run: 10.00/10, +0.00)

D:\ssd2022>flake8 auth.py
auth.py:32:80: E501 line too long (82 > 79 characters)
auth.py:65:80: E501 line too long (82 > 79 characters)
auth.py:66:9: E125 continuation line with same indent as next logical line
```

Figure 29: `auth.py`

```
D:\ssd2022>pylint main.py

-----
Your code has been rated at 10.00/10 (previous run: 10.00/10, +0.00)

D:\ssd2022>flake8 main.py
main.py:40:80: E501 line too long (82 > 79 characters)
```

Figure 30: main.py

```
D:\ssd2022>pylint models.py
***** Module ssd2022.models
models.py:25:0: R0903: Too few public methods (0/2) (too-few-public-methods)

-----
Your code has been rated at 9.50/10 (previous run: 9.50/10, +0.00)

D:\ssd2022>flake8 models.py
```

Figure 31: models.py

Admin interface

08 June 2022:

```
C:\Users\Richard\SSD2022-main\admin>pylint __init__.py
***** Module SSD2022-main.admin
__init__.py:21:31: E1101: Instance of 'BaseConfig' has no 'init' member (no-member)
__init__.py:22:44: E1101: Instance of 'BaseConfig' has no 'init' member (no-member)
__init__.py:26:4: C0415: Import outside toplevel (models.User) (import-outside-toplevel)
__init__.py:38:4: C0415: Import outside toplevel (auth.auth) (import-outside-toplevel)
__init__.py:42:4: C0415: Import outside toplevel (main.main) (import-outside-toplevel)

-----
Your code has been rated at 4.35/10

C:\Users\Richard\SSD2022-main\admin>flake8 __init__.py

C:\Users\Richard\SSD2022-main\admin>
```

Figure 32: `__init__.py`


```
C:\Users\Richard\SSD2022-main\admin>pylint auth.py
***** Module SSD2022-main.admin.auth
auth.py:69:4: E1101: Instance of 'scoped_session' has no 'add' member (no-member)
auth.py:70:4: E1101: Instance of 'scoped_session' has no 'commit' member (no-member)
auth.py:99:4: E1101: Instance of 'scoped_session' has no 'add' member (no-member)
auth.py:100:4: E1101: Instance of 'scoped_session' has no 'commit' member (no-member)

-----
Your code has been rated at 6.36/10

C:\Users\Richard\SSD2022-main\admin>flake8 auth.py
auth.py:28:80: E501 line too long (97 > 79 characters)
auth.py:31:80: E501 line too long (97 > 79 characters)
auth.py:35:80: E501 line too long (82 > 79 characters)
auth.py:37:80: E501 line too long (80 > 79 characters)
auth.py:57:80: E501 line too long (97 > 79 characters)
auth.py:59:80: E501 line too long (97 > 79 characters)
auth.py:63:80: E501 line too long (93 > 79 characters)
auth.py:65:80: E501 line too long (94 > 79 characters)
auth.py:88:80: E501 line too long (92 > 79 characters)
auth.py:89:80: E501 line too long (88 > 79 characters)
auth.py:95:80: E501 line too long (84 > 79 characters)

C:\Users\Richard\SSD2022-main\admin>
```

Figure 33: auth.py

```

(auth) C:\Users\Richard\SSD2022-main\admin>flake8 main.py
main.py:22:1: W391 blank line at end of file

(auth) C:\Users\Richard\SSD2022-main\admin>pylint main.py
***** Module SSD2022-main.admin.main
main.py:22:0: C0305: Trailing newlines (trailing-newlines)

-----
Your code has been rated at 8.57/10

(auth) C:\Users\Richard\SSD2022-main\admin>

```

Figure 34: main.py

```

C:\Users\Richard\SSD2022-main\admin>pylint models.py
***** Module SSD2022-main.admin.models
models.py:11:9: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:11:19: E1101: Instance of 'SQLAlchemy' has no 'Integer' member (no-member)
models.py:12:12: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:12:22: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:13:15: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:13:25: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:14:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:14:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:15:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:15:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)

-----
Your code has been rated at 0.00/10

C:\Users\Richard\SSD2022-main\admin>flake8 models.py
models.py:11:80: E501 line too long (89 > 79 characters)

```

Figure 35: models.py

10 June 2022:

```
(auth) C:\Users\Richard\SSD2022-main\admin>pylint __init__.py
***** Module SSD2022-main.admin
__init__.py:21:31: E1101: Instance of 'BaseConfig' has no 'init' member (no-member)
__init__.py:22:44: E1101: Instance of 'BaseConfig' has no 'init' member (no-member)
__init__.py:26:4: C0415: Import outside toplevel (models.User) (import-outside-toplevel)
__init__.py:38:4: C0415: Import outside toplevel (auth.auth) (import-outside-toplevel)
__init__.py:42:4: C0415: Import outside toplevel (main.main) (import-outside-toplevel)

-----
Your code has been rated at 4.35/10

(auth) C:\Users\Richard\SSD2022-main\admin>flake8 __init__.py
(auth) C:\Users\Richard\SSD2022-main\admin>
```

Figure 36: `__init__.py`

```

(auth) C:\Users\Richard\SSD2022-main\admin>pylint auth.py
***** Module SSD2022-main.admin.auth
auth.py:4:22: C0303: Trailing whitespace (trailing-whitespace)
auth.py:6:15: C0303: Trailing whitespace (trailing-whitespace)
auth.py:11:24: C0303: Trailing whitespace (trailing-whitespace)
auth.py:30:0: C0301: Line too long (115/100) (line-too-long)
auth.py:31:0: C0301: Line too long (121/100) (line-too-long)
auth.py:33:0: C0301: Line too long (116/100) (line-too-long)
auth.py:34:0: C0301: Line too long (117/100) (line-too-long)
auth.py:35:0: C0301: Line too long (112/100) (line-too-long)
auth.py:36:0: C0301: Line too long (111/100) (line-too-long)
auth.py:53:46: C0303: Trailing whitespace (trailing-whitespace)
auth.py:54:0: C0303: Trailing whitespace (trailing-whitespace)
auth.py:55:0: C0303: Trailing whitespace (trailing-whitespace)
auth.py:60:46: C0303: Trailing whitespace (trailing-whitespace)
auth.py:61:0: C0303: Trailing whitespace (trailing-whitespace)
auth.py:82:0: C0303: Trailing whitespace (trailing-whitespace)
auth.py:23:0: C0116: Missing function or method docstring (missing-function-docstring)
auth.py:134:4: E1101: Instance of 'scoped_session' has no 'add' member (no-member)
auth.py:135:4: E1101: Instance of 'scoped_session' has no 'commit' member (no-member)
auth.py:168:4: E1101: Instance of 'scoped_session' has no 'add' member (no-member)
auth.py:169:4: E1101: Instance of 'scoped_session' has no 'commit' member (no-member)

-----
Your code has been rated at 5.66/10 (previous run: 5.66/10, +0.00)

(auth) C:\Users\Richard\SSD2022-main\admin>flake8 auth.py
auth.py:4:23: W291 trailing whitespace
auth.py:6:16: W291 trailing whitespace
auth.py:7:80: E501 line too long (95 > 79 characters)
auth.py:11:25: W291 trailing whitespace
auth.py:26:80: E501 line too long (90 > 79 characters)
auth.py:29:80: E501 line too long (85 > 79 characters)
auth.py:30:80: E501 line too long (115 > 79 characters)
auth.py:31:80: E501 line too long (121 > 79 characters)
auth.py:32:80: E501 line too long (93 > 79 characters)
auth.py:33:80: E501 line too long (116 > 79 characters)
auth.py:34:80: E501 line too long (117 > 79 characters)
auth.py:35:80: E501 line too long (112 > 79 characters)
auth.py:36:80: E501 line too long (111 > 79 characters)
auth.py:53:47: W291 trailing whitespace
auth.py:54:1: W293 blank line contains whitespace
auth.py:55:1: W293 blank line contains whitespace
auth.py:56:5: E303 too many blank lines (2)
auth.py:60:47: W291 trailing whitespace
auth.py:61:1: W293 blank line contains whitespace
auth.py:63:5: E303 too many blank lines (2)
auth.py:82:1: W293 blank line contains whitespace
auth.py:111:1: E302 expected 2 blank lines, found 1
auth.py:130:80: E501 line too long (94 > 79 characters)
auth.py:139:5: E265 block comment should start with '#'
auth.py:140:5: E265 block comment should start with '#'
auth.py:164:80: E501 line too long (84 > 79 characters)

(auth) C:\Users\Richard\SSD2022-main\admin>

```

Figure 37: auth.py

```
(auth) C:\Users\Richard\SSD2022-main\admin>pylint main.py
***** Module SSD2022-main.admin.main
main.py:26:0: C0301: Line too long (115/100) (line-too-long)
main.py:27:0: C0301: Line too long (121/100) (line-too-long)
main.py:29:0: C0301: Line too long (116/100) (line-too-long)
main.py:30:0: C0301: Line too long (117/100) (line-too-long)
main.py:31:0: C0301: Line too long (112/100) (line-too-long)
main.py:32:0: C0301: Line too long (111/100) (line-too-long)
main.py:19:0: C0116: Missing function or method docstring (missing-function-docstring)

-----
Your code has been rated at 5.88/10

(auth) C:\Users\Richard\SSD2022-main\admin>flake8 main.py
main.py:22:80: E501 line too long (90 > 79 characters)
main.py:25:80: E501 line too long (85 > 79 characters)
main.py:26:80: E501 line too long (115 > 79 characters)
main.py:27:80: E501 line too long (121 > 79 characters)
main.py:28:80: E501 line too long (93 > 79 characters)
main.py:29:80: E501 line too long (116 > 79 characters)
main.py:30:80: E501 line too long (117 > 79 characters)
main.py:31:80: E501 line too long (112 > 79 characters)
main.py:32:80: E501 line too long (111 > 79 characters)

(auth) C:\Users\Richard\SSD2022-main\admin>_
```

Figure 38: main.py

```

(auth) C:\Users\Richard\SSD2022-main\admin>pylint models.py
***** Module SSD2022-main.admin.models
models.py:7:18: C0303: Trailing whitespace (trailing-whitespace)
models.py:9:49: C0303: Trailing whitespace (trailing-whitespace)
models.py:15:44: C0303: Trailing whitespace (trailing-whitespace)
models.py:45:0: C0303: Trailing whitespace (trailing-whitespace)
models.py:16:9: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:16:19: E1101: Instance of 'SQLAlchemy' has no 'Integer' member (no-member)
models.py:17:12: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:17:22: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:18:15: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:18:25: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:19:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:19:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:20:11: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:20:21: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:21:17: E1101: Instance of 'SQLAlchemy' has no 'Column' member (no-member)
models.py:21:27: E1101: Instance of 'SQLAlchemy' has no 'String' member (no-member)
models.py:27:8: R1725: Consider using Python 3 style super() without arguments (super-with-arguments)
models.py:38:15: C0209: Formatting a regular string which could be a f-string (consider-using-f-string)

-----
Your code has been rated at 0.00/10

(auth) C:\Users\Richard\SSD2022-main\admin>flake8 models.py
models.py:7:19: W291 trailing whitespace
models.py:9:50: W291 trailing whitespace
models.py:15:44: W291 trailing whitespace
models.py:45:1: W293 blank line contains whitespace

(auth) C:\Users\Richard\SSD2022-main\admin>

```

Figure 39: models.py

13 June 2022:

```
D:\ssd2022\admin>pylint __init__.py
***** Module ssd2022.admin
__init__.py:38:4: C0415: Import outside toplevel (models.User) (import-outside-toplevel)
__init__.py:50:4: C0415: Import outside toplevel (auth.auth) (import-outside-toplevel)
__init__.py:54:4: C0415: Import outside toplevel (main.main) (import-outside-toplevel)

-----
Your code has been rated at 9.06/10

D:\ssd2022\admin>flake8 __init__.py
__init__.py:18:80: E501 line too long (80 > 79 characters)
```

Figure 40: __init__.py

```
D:\ssd2022\admin>pylint auth.py

-----
Your code has been rated at 10.00/10

D:\ssd2022\admin>flake8 auth.py
auth.py:34:80: E501 line too long (82 > 79 characters)
```

Figure 41: auth.py

```
D:\ssd2022\admin>pylint main.py

-----
Your code has been rated at 10.00/10

D:\ssd2022\admin>flake8 main.py
main.py:29:80: E501 line too long (82 > 79 characters)
```

Figure 42: main.py

```
D:\ssd2022\admin>pylint models.py
***** Module ssd2022.admin.models
models.py:27:8: R1725: Consider using Python 3 style super() without arguments (super-with-arguments)
models.py:38:15: C0209: Formatting a regular string which could be a f-string (consider-using-f-string)

-----
Your code has been rated at 9.13/10

D:\ssd2022\admin>flake8 models.py
```

Figure 43: models.py

APPENDIX C: Functional and Code Testing

Functionality Test																												
Case ID	Description	Test Methodology	Tester / Reviewer	Severity	Result	Evidence	Resolution	Result																				
Sprint1-1	1) Create user without input 2) Create user with special character symbols 3) Usee created by ZAP scanner	1) Manual create user 2) Run ZAP scanner	T: Ying R: Ying	HIGH	Database created invalid entries	<table><thead><tr><th>id</th><th>email</th><th>password</th><th>name</th></tr></thead><tbody><tr><td>1</td><td>admin@test.com</td><td>sha256\$htGNdxjrmnd141cp\$539e173b6004d3e8d551b04562...</td><td>Admin</td></tr><tr><td>2</td><td></td><td>sha256\$WP4vMatayQqZzpvmsa8253fff93e6e066ba0ab59a74...</td><td></td></tr><tr><td>3</td><td>foo-bar@example.com</td><td>sha256\$xq7Via99T7DAR5Nz\$9c564c368ff2f4337233b0e21e...</td><td>ZAP</td></tr><tr><td>4</td><td>c:\Windows\system.ini</td><td>sha256\$SfLn8i200jZW40bs9151bf5b97b779e919016d14c7...</td><td>ZAP</td></tr><tr><td>5</td><td>..f</td></tr></tbody></table>	id	email	password	name	1	admin@test.com	sha256\$htGNdxjrmnd141cp\$539e173b6004d3e8d551b04562...	Admin	2		sha256\$WP4vMatayQqZzpvmsa8253fff93e6e066ba0ab59a74...		3	foo-bar@example.com	sha256\$xq7Via99T7DAR5Nz\$9c564c368ff2f4337233b0e21e...	ZAP	4	c:\Windows\system.ini	sha256\$SfLn8i200jZW40bs9151bf5b97b779e919016d14c7...	ZAP	5	..f
id	email	password	name																									
1	admin@test.com	sha256\$htGNdxjrmnd141cp\$539e173b6004d3e8d551b04562...	Admin																									
2		sha256\$WP4vMatayQqZzpvmsa8253fff93e6e066ba0ab59a74...																										
3	foo-bar@example.com	sha256\$xq7Via99T7DAR5Nz\$9c564c368ff2f4337233b0e21e...	ZAP																									
4	c:\Windows\system.ini	sha256\$SfLn8i200jZW40bs9151bf5b97b779e919016d14c7...	ZAP																									
5	..f																											

Figure 44: Sprint 1 - Functional Testing

Functionality Test																							
Case ID	Description	Test Methodology	Tester / Reviewer	Severity	Result	Evidence	Resolution	Result															
Sprint2-1	File data stored with the file encryption key	Check on mysql	T: Ying R: Ying	HIGH	Failed	<table><thead><tr><th>fileid</th><th>filename</th><th>data</th><th>role</th><th>key</th></tr></thead><tbody><tr><td>36</td><td>Confidential_text.txt</td><td>BL0%</td><td>ISS</td><td>PvH0dKGQ9r-GRoJT6JM</td></tr><tr><td>37</td><td>Confidential_text.txt</td><td>BL0%</td><td>ISS</td><td>fTdAP6wLmWnN1UFlmj</td></tr></tbody></table>	fileid	filename	data	role	key	36	Confidential_text.txt	BL0%	ISS	PvH0dKGQ9r-GRoJT6JM	37	Confidential_text.txt	BL0%	ISS	fTdAP6wLmWnN1UFlmj	Used master with multiFernet cipher_suite = MultiFernet([file_key , master_key])	Resolved
fileid	filename	data	role	key																			
36	Confidential_text.txt	BL0%	ISS	PvH0dKGQ9r-GRoJT6JM																			
37	Confidential_text.txt	BL0%	ISS	fTdAP6wLmWnN1UFlmj																			
Sprint2-2	1) File able to download with unlisted File ID 2) Invalid File ID respond 500	Manual download files	T: Richard R: Ying	HIGH	Failed	<div><div>List of Files</div><div>This is a list of all the file available for you.</div><table><thead><tr><th>File ID</th><th>File Name</th><th>Upload date (UTC)</th><th>Owner</th></tr></thead><tbody><tr><td>40</td><td>Confidential_text.txt</td><td>None</td><td>None</td></tr></tbody></table><div>Download</div><div>4</div><div>Download</div></div>	File ID	File Name	Upload date (UTC)	Owner	40	Confidential_text.txt	None	None	Validate the submitted File ID with the current user role	Resolved							
File ID	File Name	Upload date (UTC)	Owner																				
40	Confidential_text.txt	None	None																				

Figure 45: Sprint 2 - Functional Testing

Code Test																
Case ID	Description	Test Methodology	Tester / Reviewer	Severity	Result	Evidence	Resolution	Result								
Sprint1-1	Scanning common security issues with Bandit	bandit -r "D:\SSD2022-main" -f html -o "D:\bandit.report.html"	T: Ying R: Ying	LOW	Hardcoded password found	<div>hardcoded_password_string: Possible hardcoded password: '8f9eshf0Hf9eo20djsDF' Test ID: B105 Severity: LOW Confidence: MEDIUM CWE: CWE-259 File: D:\SSD2022-main__init__.py Line number: 19 More info: https://bandit.readthedocs.io/en/1.7.4/plugins/b105_hardcoded_password_string.html</div> <div><pre>18 19 app.config['SECRET_KEY'] = '8f9eshf0Hf9eo20djsDF' 20 app.config['SQLALCHEMY_DATABASE_URI'] = \</pre></div>	Add config.yaml to store config and keys	Resolved								
Sprint1-2	Scanning common security issues with Bandit	bandit -r "D:\SSD2022-main" -f html -o "D:\bandit.report.html"	T: Ying R: Richard	HIGH	Werkzeug debugger found	<div>flask_debug_true: A Flask app appears to be run with debug=True, which exposes the Werkzeug debugger and allows the execution of arbitrary code. Test ID: B201 Severity: HIGH Confidence: MEDIUM CWE: CWE-94 File: D:\SSD2022-main\file_listing.py Line number: 57 More info: https://bandit.readthedocs.io/en/1.7.4/plugins/b201_flask_debug_true.html</div> <div><pre>56 if __name__ == '__main__': 57 app.run(debug=True)</pre></div>	Remove debug=True	Resolved								
Sprint1-3	Scan website with vulnerability scanner	OWASP ZAP with auto scanning	T: Ying R: Ying	Medium	HTTP header security issues found	<div>X-Frame-Options Header Not Set</div> <div><table><tr><td>Source</td><td>raised by a passive scanner (X-Frame-Options Header)</td></tr><tr><td>CWE ID</td><td>1021</td></tr><tr><td>WASC ID</td><td>15</td></tr><tr><td>Reference</td><td><ul style="list-style-type: none">https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/X-Frame-Options</td></tr></table></div>	Source	raised by a passive scanner (X-Frame-Options Header)	CWE ID	1021	WASC ID	15	Reference	<ul style="list-style-type: none">https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/X-Frame-Options	Added repsonse headers: response.headers["X-Frame-Options"] = "SAMEORIGIN"	Resolved
Source	raised by a passive scanner (X-Frame-Options Header)															
CWE ID	1021															
WASC ID	15															
Reference	<ul style="list-style-type: none">https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/X-Frame-Options															

Figure 46: Sprint 1 - Code Testing

Code Test								
Case ID	Description	Test Methodology	Tester / Reviewer	Severity	Result	Evidence	Resolution	Result
Sprint2-1	Reset Password form: Profile page	Manual test with Inspect	T: Richard R: Ying	Medium	POST allows email in form to be edited. This could allow to change the email using Burp Suite in order to change the password for another user.	<pre>@auth.route('/update', methods=['POST']) def update_post(): """Update User""" # if returns a user, then the email exists in database email = request.form.get('email') user = User.query.filter_by(email=email).first() password = request.form.get('password') user.password = generate_password_hash(password, method='sha256', salt_length=8) # update the user to the database db.session.add(user) db.session.commit() flash('User Updated') return redirect(url_for('main.profile'))</pre>	Changed code to obtain email via current_user.email attribute	Resolved
Sprint2-2	Scan website with vulnerability scanner	OWASP ZAP with auto scanning	T: Ying R: Ying	Medium	HTTP header security issues found	CSP: Wildcard Directive <div>Source</div> raised by a passive scanner (CSP) <div>CWE ID</div> 693 <div>WASC ID</div> 15 <div>Reference</div> <ul style="list-style-type: none"> http://www.w3.org/TR/CSP2/ http://www.w3.org/TR/CSP/ 	CSP defined the list of directives Ref: https://groups.google.com/g/zaproxy-users/c/5c5XrVvPwc	Resolved
Sprint2-3	Scan website with vulnerability scanner	OWASP ZAP with auto scanning	T: Ying R: Ying	LOW	HTTP header security issues found	Incomplete or No Cache-control Header Set <div>Source</div> raised by a passive scanner (Incomplete or No Cache-control Header Set) <div>CWE ID</div> 525 <div>WASC ID</div> 13 <div>Reference</div> <ul style="list-style-type: none"> https://cheatsheetseries.owasp.org/cheatsheets/Session_Management_Cheat_Sheet.html#web-content-caching https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/Cache-Control 	Added response headers: response.headers["Cache-Control"] = "no-cache, no-store, must-revalidate"	Resolved

Figure 47: Sprint 2(a) - Code Testing

Code Test									
Case ID	Description	Test Methodology	Tester / Reviewer	Severity	Result	Evidence	Resolution	Result	
Sprint2-4	Scan website with vulnerability scanner	OWASP ZAP with auto scanning	T: Ying R: Ying	LOW	Absence of Anti-CSRF Tokens	Absence of Anti-CSRF Tokens <div>Source</div> raised by a passive scanner (Absence of Anti-CSRF Tokens) <div>CWE ID</div> 352 <div>WASC ID</div> 9 <div>Reference</div> <ul style="list-style-type: none">http://projects.webappsec.org/Cross-Site-Request-Forgeryhttp://cwe.mitre.org/data/definitions/352.html	Add CSRFProtect for all form	Resolved	
Sprint2-5	Scan website with vulnerability scanner	OWASP ZAP with auto scanning	T: Ying R: Ying	LOW	Cookie without SameSite Attribute	Cookie without SameSite Attribute <div>Source</div> raised by a passive scanner (Cookie without SameSite Attribute) <div>CWE ID</div> 1275 <div>WASC ID</div> 13 <div>Reference</div> <ul style="list-style-type: none">https://tools.ietf.org/html/draft-ietf-httpbis-cookie-same-site	Add application configuration ['SESSION_COOKIE_SAME SITE'] = "Strict"	Resolved	

Figure 48: Sprint 2(b) - Code Testing