# Ben Molloy (Individual Project)

## Student Information


- Ben Molloy
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- GitHub: **Project GitHub (https://github.com/btmolloy/ASE-285-Individual-Project)**


## Planning the Individual Project

### Summary of the Project

This project is about creating a secure and efficient way to handle user login information. Imagine you have a box where you keep all your secrets safe, and only you have the key. We're building a digital version of this box for websites, where users' email addresses and passwords are kept secure. When someone wants to access their account, our system checks if they have the right key (password) in a way that even if someone else finds the box, they can't understand what's inside it because everything is in a secret code.

### Goals

The primary goal of this project is to develop a secure, reliable, and user-friendly system for managing login credentials. In today's digital age, where data breaches and identity theft are increasingly common, ensuring the confidentiality and integrity of user data is paramount. Our project aims to implement a robust encryption mechanism that transforms plain text passwords into secure codes. This mechanism not only enhances security but also ensures that the system can efficiently authenticate users without directly exposing their sensitive information. By leveraging cutting-edge technologies such as Node.js for the backend, Mongoose for database management, and encryption algorithms for security, we aspire to set a new standard for secure login systems. The end result will be a platform that users can trust with their most sensitive data, knowing that their privacy is safeguarded to the highest degree possible.

### Why?

Achieving the project goal is crucial for safeguarding user privacy and maintaining the integrity of online services. In an environment where data breaches and unauthorized access are prevalent, the

need for robust security measures is more pressing than ever. The project's focus on secure encryption and authentication of login credentials addresses this need directly, offering a preventative solution to potential security threats. This not only protects users' sensitive information but also reinforces trust in digital platforms, an essential component for their success and user retention. By prioritizing user privacy and data security, we contribute to a more secure and reliable digital landscape, where users can interact with services confidently and without fear of compromise.

# Features/Requirements through User Stories

### 1) Encryption and Secure Storage for Login Credentials

- As a student, I want to encrypt passwords from a text file using a secure hash algorithm so that they cannot be easily deciphered by unauthorized individuals.
- As a student, I want to store encrypted passwords along with user emails in a MongoDB database using Mongoose so that user credentials are securely managed and easily retrievable.
- As a student, I want to generate a unique salt for each password before encryption to enhance security by ensuring that each hash is unique, even for identical passwords.

### 2) Authentication Validator with Encrypted Data Matching

- As a student, I want to develop a functionality that accepts email and password inputs, encrypts the input password, and compares it with the stored hash to authenticate users securely.
- As a student, I want the system to return true for a login attempt when the user's email and password match the encrypted credentials in the database, ensuring that the user is authenticated correctly.
- As a student, I want the system to return false for login attempts with incorrect passwords, non-existent email addresses, or when no password is provided, to prevent unauthorized access.
- As a student, I want to implement a mechanism to handle edge cases in user authentication, such as empty input fields or invalid email formats, to ensure the system's reliability and user-friendliness.

# Project Test Plan

### Unit Tests

- **File Encryption Test:** Verify that plain text passwords are correctly encrypted.
- **Database Write Test:** Ensure that encrypted passwords and user emails are correctly written to the MongoDB database.

- **Unique Salt Generation Test:** Test the salt generation process for each password to confirm that each salt is unique and correctly enhances the encryption.
- **Authentication Process Test:** Ensuring that the system accurately compares encrypted input passwords against stored hashes and returns true or false as appropriate.

**Integration Tests**

- **Encryption to Storage Workflow:** Test the integrated workflow from password encryption to storage in the database, ensuring seamless data handling and error-free execution.
- **Authentication Validation:** Evaluate the integration between the input authentication process and the database retrieval of encrypted credentials, confirming the system's ability to correctly authenticate or reject user logins based on stored data.

**Regression Tests**

- **Feature Update Stability Test:** After any updates or changes to the encryption algorithm or database schema, verify that existing functionalities, such as password storage and user authentication, remain unaffected and operate as expected.
- **Error Handling Enhancements Test:** Ensure that improvements in error handling for edge cases (e.g., empty fields, invalid formats) do not adversely affect the system's performance or existing user experience.

**Acceptance Tests**

- **User Login Scenario Test:** Simulate various user login scenarios, including correct credentials, incorrect passwords, non-existent emails, and edge cases, to assess whether the system's responses align with the requirements.
- **Correct Login Test:** Ensure the system returns true for correct email/password combinations and false for incorrect ones.

# Milestones and Deadline

- Milestone 1: Planning Complete
  - Date: 3/24/24
  - Goal: All planning should be complete, in words on the Canvas Page.
- Deadline 1: Prototype Complete
  - Date: 3/31/24
- Milestone 2: Feature 1
  - Date: 4/4/24
  - Goal: All code involving feature 1 should be complete.
- Milestone 3: Feature 2
  - Date: 4/7/24

    - Goal: All code involving feature 2 should be complete.
- Deadline 2: Ver 1 Complete
    - Date: 4/14/24
- Milestone 4: Tests Complete
    - Date: 4/21/24
    - Goal: All tests for the application should be finished by this point. Additionally any fine tunning of the code should be finished by this point.
- Milestone 5: Documentation Complete
    - Date: 4/26/24
    - Goal: All documentation for the application should be finished by this point.
- Deadline: Final Version Complete
    - Date: 4/28/24

# Risk Analysis

1. ROTC - Every Monday, Wednesday, Friday morning
2. MAT 483 Software Final - TBD
3. Military JFTX - 3/21 to 3/24
4. Military Ball - 4/20
5. Research Project - TBD
6. P3 & 4 Technical Writing - TBD
7. CSC 460 Program - 3/31
8. HW8 Deadline - 5/3

# Project Progress

# Feature Implementation

## Week 1

Total LoC / Burndown: 0 / 5%

### Summary

This was the first week of the individual project so the first few steps in the project have began and have been completed. This includes all of the planning involved from now until the submission of the

project. Additionally, the GitHub and tools were selected and prepared for the coming weeks as the projects starts to be built. Lastly, the designing of the application has begun.

### Milestones or risks in this week

This week 1 Milestone was completed and met which was to finish the planning for the project. This includes completing this canvas page and organizing all of the tools and materials I will be using during this project. As for risks this week, there were two which were Military JFTX on 3/24/24 as well as ROTC which was Monday, Wednesday and Friday.

### Code

No code was written this week, however, the GitHub repository was created for the code which can be accessed **here (https://github.com/btmolloy/ASE-285-Individual-Project)** .

## Week 2

Total LoC / Burndown: 0 / 8%

### Summary

This week, one of my biggest risks occurred which led to very little time being allocated to working on the individual project. However, I was able to design some of the finer details around my features and the general architecture of this application. Currently, I am on schedule as planned.

### Risk Analysis

This week a large risk happened, which lead to little time being allocated to working on the individual project.

### Design

I was able to work slightly on the design document **here (https://github.com/btmolloy/ASE-285-Individual-Project/tree/main/Documents/Deliverables/Artifacts/Design%20Documents)** .

## Week 3

Total LoC / Burndown: 0 / 16%

### Summary

This week, another large risk occurred so again I didn't have time to make any large changes to this project. I was able to finish the design and architecture of the project though.

### Risk Analysis

This week a large risk happened, which lead to little time being allocated to working on the individual project.

### Design

With the little time I had this week, I finished up the rest of the design documents **here (https://github.com/btmolloy/ASE-285-Individual-Project/tree/main/Documents/Deliverables/Artifacts/Design%20Documents)** .

## Week 4

Total LoC / Burndown:  147 / 33%

### Summary

Although slightly behind schedule, 1 deadline and 2 milestones were met this week, finishing the prototype. There was also a fairly large risk that happened this week.

### Milestones

This week 1 deadline was reached and 2 milestones were complete. The prototype deadline was reached and 2 features (one milestone each) were met.

### Risk Analysis

Once again, I had a large risk this week, however, it did not prevent me from getting a fair amount of work done.

### Code

I began coding this week, finishing the prototype which can be seen **here (https://github.com/btmolloy/ASE-285-Individual-Project/releases/tag/v1.0)** .

## Week 5

Total LoC / Burndown: 201 / 66%

### Summary

This week I was able to reach my second deadline and began another milestone. I finished my Version 1 of the project and then I began creating code. I also worked on cleaning up my code to make it more efficient

### Milestones

The Version 1 deadline was complete this week. Also, I began working on the tests milestone.

### Risk Analysis

Once again, I had a large risk this week, however, it did not prevent me from getting a fair amount of work done.

### Code

This week I finished my first version and started on testing code which can be seen **here (https://github.com/btmolloy/ASE-285-Individual-Project/releases/tag/v2.0)** .

### Tests

This week I began working on my tests milestone which can be seen **here (https://github.com/btmolloy/ASE-285-Individual-Project/tree/main/__test__)** .

## Week 6

Total LoC / Burndown: 233 / 85%

### Summary

This week I finished refining my code and created the necessary tests for it. In doing so I completed my 4th milestone to finish testing code. I then began to work on milestone 5, to complete documentation.

### Milestones

This week I completed my fourth milestone to finish all of the testing required for my code. I also began to work on the 5th milestone to create and finish my documentation which can be seen **here (https://github.com/btmolloy/ASE-285-Individual-Project/tree/main/Documents)** .

### Risk Analysis

As I have for the past few weeks, I had a large risk this week, however, it did not prevent me from getting a fair amount of work done.

### Code

For code this week, all I did was worked on refining what I have since I have already completed my features. This can be seen **here (https://github.com/btmolloy/ASE-285-Individual-Project)** .

### Tests

This week I finished the coding for all of my unit, integration, regression and acceptance tests which can be seen **here (https://github.com/btmolloy/ASE-285-Individual-Project/tree/main/__test__)** .

## Week 7

Total LoC / Burndown: 233 / 100%

### Summary

This was the last week of the project before the final deadline and due date. This week I completed all of my documentation and finalized my submission directory and code for submission. Milestone 5 was met as well as the final deadline.

### Milestones

This being the last week, I finished milestone 5 as well as the final deadline.

### Risk Analysis

This being close to finals/finals week, I had a large risk this week, however, it did not prevent me from finishing on time.

### Code

This week I made a few tweaks to my code and finalized everything which can be seen **here (https://github.com/btmolloy/ASE-285-Individual-Project)** .

### Document

This week I finished the rest of my documentation such as executive summary, user manuals, requirements/user story document etc. which can be see **here (https://github.com/btmolloy/ASE-285-Individual-Project/tree/main/Documents/Deliverables)** .