Carl Allen

Capstone 499

Course Outcomes

**Course Outcome 1:**  
I employed strategies to build collaborative environments that support diverse audiences in organizational decision-making within the field of computer science by implementing key enhancements to my application's security infrastructure. These measures promote user confidence by ensuring data privacy and protection—critical elements for any system that supports collective decision-making. Additionally, I enabled the application to run across multiple machines on the same network, demonstrating scalability and the potential for broader user collaboration and accessibility within an organization.

**Course Outcome 2:**  
I designed, developed, and delivered professional-quality oral, written, and visual communications that are coherent, technically sound, and tailored to specific audiences and contexts. This was demonstrated through enhancements that emphasized clarity and structure in my written narrative. I introduced the enhancement project with contextual rationale, detailed my selection of the Python application, and explained each code improvement in a logical sequence. Code examples were presented with thorough explanations of their function and impact. Incorporating peer feedback, I added inline comments and header sections, enhancing readability and demonstrating strong documentation practices. Reflective elements were also included to articulate design decisions, optimization opportunities, and overall success. These written and visual elements effectively conveyed complex technical content in an accessible manner.

**Course Outcome 3:**  
I designed and evaluated computing solutions to solve specific problems using algorithmic principles and computer science standards, while managing trade-offs in design decisions. This is exemplified in my use of regular expressions within the create\_regex\_pattern function, demonstrating my ability to craft efficient, flexible search algorithms. I also implemented a filter\_criteria dictionary to centrally manage filter logic—reducing redundancy and improving code maintainability. This required a deliberate trade-off between initial setup complexity and long-term manageability, a challenge I addressed by consolidating logic and organizing data structures to create a modular and readable solution.  
Additionally, I communicated these enhancements using a structured narrative that supported the reader’s understanding. I began by framing the project context, followed by technical justifications and detailed code examples. Feedback was integrated through added comments and headings, and visual examples were used to improve clarity. Reflective commentary on design decisions and areas for future refinement further reinforced the depth of my analysis and technical communication skills.

**Course Outcome 4:**  
I demonstrated the ability to apply well-founded and innovative tools, techniques, and skills in computing practices to develop solutions that deliver value and meet industry-specific goals. This was achieved through enhancements such as the use of the external passlib library for secure password hashing, showcasing my understanding of third-party tool integration. I also leveraged MongoDB by designing a collection specifically for storing user data. Additional interface components—namely 'Login' and 'Register' buttons—expanded the dashboard's functionality, while supporting logic improved user interaction and data handling. Separating authentication logic into a dedicated auth.py file aligned with software design best practices. Furthermore, I addressed common security concerns by preventing duplicate usernames, demonstrating proactive problem-solving and architectural foresight.

**Course Outcome 5:**  
I developed a security-first mindset by anticipating adversarial threats and implementing architectural safeguards to mitigate vulnerabilities and enhance data privacy. My enhancements included password hashing via passlib before storage in the database, preventing direct exposure of sensitive credentials. The authentication system validates user login attempts by comparing input against hashed records, effectively blocking unauthorized access. Additionally, I introduced a conditional UI feature that restricts access to the “Add Animal” button component exclusively to registered users. This limitation helps prevent misuse or flooding of irrelevant data into the system. These implementations reflect both design-level and practical application of security principles, affirming my ability to create secure, privacy-conscious solutions.