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Module 3 – Captsone

Narrative – Category 1

1. **Briefly Describe the Artifact. What is it? When was it created?**

The artifact is a Mobile Warehouse Inventory System developed as part of my coursework in CS 360: Mobile Architecture. The artifact is spread across two current files and one new file in which changes were made as previously discussed. This Android application allows users to manage warehouse inventory, including adding, updating and deleting inventory items. It also features a user authentication system and the ability to send SMS text message when an inventoried item reaches a threshold. The project was created in early 2024.

1. **Justify the inclusion of the artifact in your ePortfolio. Why did you select this item? What specific components of the artifact showcase your skills and abilities in software development? How was the artifact improved?**

**Why did I select this item:**

I selected this project and artifact because it demonstrates my skills in software design and engineering. This project, developed during my coursework in CS 360 showcases my ability to design, develop and enhance a mobile application using software engineering principles.

**What specific components of the artifact showcase your skills and abilities in software development:**

1. User Authentication System: The original authentication system used a simple SQL lite database to manage user authentication. I implemented JWT (JSON web token) for secure user authentication, demonstrating my ability to enhance security in application design. This change makes sure that storage is secure and exchanging of permission are secure, making the overall system secure. To accomplish this, I created a new Class, “JWTUtils” to handle the generation, validation, of JWT tokens. Furthermore, changes were made to the other two files to incorporate the user of JWT. Additionally, slight changes in comments and overall readability of the application were made.

**How was the artifact improved?**

1. **Original Data Flow**: In the original version of the application, the authentication system was simplistic and relied on querying the SQLite database for user credentials. The approach, although functional, has some issues:
   1. Security Concerns: Storing and retrieving plaintext passwords posed significant risks.
   2. Session Management: There was no session management, making it difficult to maintain user session securely.
2. **New Data Flow**: With the enhancement, the application now uses JWT for secure user authentication and session management.
   1. User Login: After verifying user credentials against the database, a JWT token is created using the JWTUtils class. This token contains user information and has an expiration date.
   2. Token Generation: The JWTUtils class creates a JWT token upon login. This token is signed with a secret key to ensure its authenticity and then is sent to the client.
   3. Token Validation: When a user access protected resources, the JWT token is sent with the request, and the JWTUtils class validates the token, checking its signature and expiration date.
   4. Session Managment: JWT tokens provide a secure and stateless way to manage user sessions. Tokens are self contained and include all necessary user information
3. **Did you meet the course objectives you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?**

Yes, I met the course objectives for Category 1 that I planned to with this enhancement. I felt I could have spent additional time looking at the UI changes, but for this enhancement, I really wanted to dive deep into authentication and was successful in doing so. The changes I made ensure that user authentication is more secure and efficient, protecting the user information. By creating the JWTUtils class, I was able to centralize all the JWT related logic, making it easier to understand. This improvement aligns well with the Software design and engineering, demonstrating my ability to implement secure and robust solutions.

1. **Reflect on the process of enhancing and modifying the artifact. What did you learn as you were creating it and improving it? What challenges did you face?**

During the enhancement, I learned a great deal about implementing secure authentication systems using JWT tokens. Creating the JWUtils class was a significant part of this journey. One of the main challenges I faced was integrating the JWT authentication into the existing application. This required significant understanding of JWT mechanisms and how to apply them in the real world.

Another challenge was ensuring that the new authentication system worked seamlessly with the existing application flow. This involved modifying the login and account creation process to incorporate the JWT token handling.

Overall, this process improved my understanding of software engineering and desing and highlighted the importance of authentication.