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CS-499 Computer Science Capstone

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**3-2 Milestone Two Narrative – Enhancement One: Software Design and Engineering**

**Artifact Overview:**  
The artifact I selected is a Java-based Spring Boot application named SslServerApplication.java, created in my CS-305 Software Security course. It exposes a RESTful endpoint (/hash) that returns a SHA-256 hash of a string. At the time, it served as a basic example of secure web service design, but it lacked modularity, proper documentation, logging, and SSL configuration.

**Why This Artifact:**  
I chose this artifact because it provides a solid foundation for demonstrating software design and engineering principles. It had a clear purpose and ran successfully, but was lacking in several best practices. It allowed me to showcase my ability to evolve a working solution into a more professional, secure, and maintainable application.

**Skills Demonstrated:**  
Through this enhancement, I applied several core software design practices:

* I added JavaDoc at the class and method levels to improve readability and future maintainability.
* I integrated SLF4J logging to track important system events, including startup, endpoint access, and error handling.
* I refactored the hashing logic into a separate HashUtil class to promote modularity and reuse.
* I enabled HTTPS by configuring the application.properties file to use a secure keystore for encrypted communication.

**Course Outcomes Met:**  
This enhancement directly supports the CS-499 outcomes related to secure software engineering, clean design, and professional coding standards. It demonstrates my ability to design maintainable systems, use modular programming practices, and implement basic security configurations.

**Reflection:**  
One of the most important lessons I learned during this process was the value of thoughtful modular design. By separating the hashing logic from the controller logic, the application became easier to scale and test. Setting up SSL was also a great reminder of how small configuration changes can greatly improve security. A challenge I faced was organizing logging output in a way that remained meaningful but not too verbose. Overall, this enhancement helped me solidify my understanding of software design principles and taught me how to make a working prototype more production ready.