Reflective Piece for Secure Software Development

This reflective piece outlines the learning experiences gained during the Secure Software Development module, utilising Rolfe et al.'s reflective model—What, So What, Now What—to organise the analysis. The module offered an in-depth examination of contemporary software development methodologies, with a significant focus on the integration of security throughout the entire development lifecycle. By comparing different development methodologies and utilising UML techniques in group assignments and testing practices, I experienced continual progression in becoming a developer with a focus on security.

(Marnewick, 2023)

What?

An analysis of management strategies in software development revealed that the waterfall model provides linear progression, while agile methodologies support iterative development, improving ongoing security. The investigation emphasised integrating security at every stage of development.

In Week 2, the emphasis was placed on developing UML flow charts to decompose intricate activities into understandable, actionable tasks. These diagrams were essential for illustrating the system's architecture and incorporating security measures. They functioned as both design documentation and instruments for facilitating communication with stakeholders.

During Week 3, our group created a Team Design Document focused on developing a secure system with essential features like role-based access control, password hashing, file encryption, checksums, and audit logging. The feedback was positive, highlighting our thorough research and detailed use case diagrams, along with our adherence to object-oriented principles. However, recommendations included presenting a defined list of security features at the document's start, enhancing relationships in our use case diagrams—such as linking modify and view artefacts, and using an extend association for the 'Authenticate user' use case—and improving overall presentation with a cover page and table of contents. This feedback was vital for refining my design and communication skills, emphasising clarity and comprehensiveness in technical documentation.

During Week 4, the emphasis was placed on software testing. I acquired the skills to create thorough test plans aimed at identifying security vulnerabilities and utilising automated tools such as Python linters and Bandit to detect possible weaknesses. This segment underscored the importance of consistent and meticulous testing in ensuring the security and quality of software.

In Weeks 5 and 6, we examined future trends and security characteristics of programming languages. Emerging technologies like fog computing, IoT, and cyber-physical systems were discussed along with languages such as Python, Rust, and Swift. This highlighted the need for ongoing education and adaptability in the dynamic cybersecurity field.

So What?

Upon reviewing my experiences, it is evident that secure software development is a complex process that integrates technical, methodological, and collaborative competencies. The module underscored that security is not merely an additional feature but a core component embedded in every stage of development. The group assignment during Week 3 notably illustrated the significance of an organised design document and the effective communication of security features. Constructive criticism from instructors and fellow students enhanced my understanding of the intricacies involved in technical documentation and design, encouraging me to add more accurate details and elevate the overall quality of our work.

(Zhang et al.2024)

Now What?

In the future, I will integrate these insights into my projects by thoroughly implementing agile methodologies to enhance security in development. I plan to better utilise UML and design tools by adding security features lists from the start and ensuring accurate system interaction diagrams. I will also improve testing by automating security checks in the workflow. Lastly, I'll maintain a reflective journal to track progress and insights for continuous personal and professional growth in secure software development.

In this module, I have expanded my technical understanding and cultivated a more analytical and systematic method for designing secure systems—an approach that I intend to apply throughout my professional journey.

References:

Marnewick, C., 2023. Student experiences of project-based learning in agile project management education. Project Leadership and Society. sciencedirect.com

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