Final Reflective Piece

This reflective essay will explore my learning journey and experiences during the Secure Software Development module using the Rolfe et al. (2001) reflective model, which includes three stages: *What?*, *So What?*, and *Now What?*. Specifically, it will provide insights into the practical challenges, successes, learning experiences, and teamwork opportunities that have informed my professional growth throughout this Secure Software Development module.

What?

During this module, the primary goal was to collaboratively design and individually build a secure, Python-based software application, following best practices and security principles. The design document, a Django-based school Learning Management System (LMS), required implementing user management, secure APIs, and handling security threats like brute-force attacks and API injection attacks. Within a team of four, my role involved implementing General Data Protection Regulations (GDPR) for schools, security requirements, and tools and technologies. We worked together to develop the application, divide responsibilities, and address potential security vulnerabilities in line with secure software development principles.

Unfortunately, three of the four team members, including myself, were assigned this module as our very first in the Masters of Computer Science program. This particular module was designed to build on foundational skills from "*Launching Into Computer Science*" and "*Object-Oriented Programming.*" Providing computing students with foundational skills not only enhances their competence but also boosts their confidence in their abilities (Johnson & Gleit, 2022). Therefore, being assigned to this module without this prior knowledge made it significantly more challenging to meet the requirements.

Despite this hurdle, we took on the group project with determination and fostered a supportive environment where knowledge-sharing became a priority. We held regular team

meetings to discuss progress, troubleshoot issues, and ensure alignment on development goals; these are all considerably important skills to develop for future agile projects (Strode et al., 2022). Additionally, despite the design document being a group project, we were expected to build the LMS individually. Therefore, the meetings played an important role in defining the scope, clarifying uncertainties, and sharing solutions, which are all vital skills for a career in software development (de Souza Santos & Ralph, 2022). Ironically, it was our initial lack of knowledge that bolstered a sense of teamwork and support within the group.

So What?

Reflecting on my experience, several important lessons emerged. Academically-speaking, the project revealed how small security oversights could lead to significant vulnerabilities. For example, during the individual project development, I discovered that a weak implementation of password storage could expose user credentials to brute-force attacks. This realisation led me to investigate better encryption methods and hashing algorithms, such as the use of bcrypt, which improved the security of my application (Skanda et al., 2022). Additionally, I gained a deeper understanding of secure API design. Working on the api.py file for secure and insecure application execution required me to think critically about how the system should respond to potential threats (Skanda et al., 2022).

Another key reflection was the challenge of coordinating work across different time zones and accommodating various levels of expertise. There were times when delays occurred because of miscommunication or unclear task ownership. For instance, we faced difficulty when two team members misunderstood who was responsible for designing the UML diagrams, resulting in duplicate efforts and wasted time. It is evident that communication, or lack thereof, is the largest contributor to time wastage and inefficiency in software development projects (Alzoubi & Gill, 2021). Learning from this, we adopted agile principles, such as Scrum, to manage our workflow, which involved short, iterative sprints and frequent check-ins (Strode et al., 2022).

Moreover, the experience of playing different roles in the project provided a holistic view of the software development lifecycle. As a developer, I honed my skills in Python and Django, deepening my understanding of both secure software design and the frameworks that support it. When working as a security tester, I learned to adopt an attacker's mindset, identifying potential weaknesses and simulating attacks to see how our system responded (Chng et al., 2022). These varied roles expanded my knowledge base and highlighted the interdisciplinary nature of secure software development.

Now What?

Moving forward, I will consider the critical importance of secure coding practices as a cornerstone of the development process (Chng et al., 2022). This module has shown that security cannot be an afterthought; it must be integrated from the very beginning of the project (Skanda et al., 2022). In future projects, I will take a proactive approach to identifying and mitigating security risks, using insights from this module to implement security measures early in the design phase. From a technical perspective, I am now more aware of the wide range of security testing tools available and how they can be used to strengthen software applications. I plan to further explore advanced testing methodologies, including OWASP ZAP and incorporating Continuous Integration/ Continuous Deployment (CI/CD) pipelines to automate security testing as part of the development process.

I also aim to improve my project management skills. While Scrum was effective, clearer task allocation and better communication tools could have prevented delays (Strode et al., 2022). I plan to use tools like Trello to enhance accountability and track progress. Additionally, the experience of shifting between different roles within the team has encouraged me to seek out interdisciplinary projects that combine my background in Psychology, Education, and Computer Science. As I continue my career in educational technologies, I see an opportunity to apply the lessons learned in secure software development to create safe, user-friendly platforms for mental

health and education. Building systems that prioritize both usability and security is now a goal I am passionate about pursuing.

Conclusion

In conclusion, this module provided an invaluable learning experience that significantly shaped my understanding of both technical and interpersonal aspects of the development process. By reflecting on my experiences, I was able to critically assess the challenges and successes encountered throughout. The insights gained, especially in terms of security, teamwork, and project management, will serve as valuable guiding principles for my future endeavours as a developer and team member.

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