Best practices in coding to prevent vulnerabilities and protect against cyber-attacks

Nichita Maftei K2205319

Kingston University

1. Introduction

Software is becoming increasingly intertwined with our day-to-day lives, anywhere from relying on smartphones to track our health (Turner, 2022) to allowing people to work from home. People also rely on software to handle and transmit their vast array of sensitive information from social media, to banking and shopping. However, as our dependence on software expands, so do the risks of potentially having your data leaked. Cyber-attacks such as malware, and the use of zero days, can have severe ramifications for not only individuals but organisations as well. Security and data breaches have resulted in an average financial impact of 9.4 million dollars in 2013 and this number was expected to increase significantly as the world moves to an ever more online world (B.C.E., M. J. H., 2015). An important and crucial way we can protect against these attacks is through best practices in secure coding. Secure coding is the practice of writing code whilst keeping in mind potential vulnerabilities (Foster, 2020). Software developers follow guidelines and best the practices in order to avoid creating potential vulnerabilities for hackers to exploit.

This report will discuss the importance of best practices in order to prevent cyber-attacks and the other added benefits such as easy maintenance for future developers. In addition, this report will also make specific recommendations for professional practice.

2. The importance of best practices in coding

Best practices in coding refer to a set standard or a set of guidelines and recommendations that anyone developing software, especially professionally, should follow when developing code (Wright, 2022). These practices were iterated over time adding new recommendations as the field matures and as software developers gain knowledge from each other, whether it be from experience or learning from past mistakes. These guidelines are designed to improve the overall quality, maintainability and security of the code being produced. Other benefits include better workflow, increased productivity and efficiency, enhanced product quality and reduced costs (Scalerandi, 2020).

Subsequently adhering to these guidelines will allow software developers to spot bugs early on in their project, this also ensures that the code written by software Is consistent. This is important when other developers are tasked with maintaining and understanding the code. This translates to fewer vulnerabilities hackers can potentially exploit in order to gain access to the information the code is trying to protect. This ranges anywhere from emails to credit to health to even health records.

3. Recommendations

The following are recommendations for best coding practices to prevent vulnerabilities and protect against cyber-attacks.

3.1 Documentation

Documenting code helps to make sure the people working on your code in the future can maintain it as you or future developers might not understand what or why you did a certain thing which is why explaining documentation is very crucial in producing your code for the industry. Documenting not only improves clarity in the code you write but also allowing collaborations to be smooth and easy by adding explanations to your code to make it clear and easy to follow.

1. Clear and concise comments within the code are extremely important when developing code. This helps pinpoint very specific areas of the code you wrote for you or future developers to understand what they do. These comments could be describing anywhere from functions to variables or even what certain chunks of the code does.

2. Online documentation is also really important. This documentation is more wide scope as it focuses on the whole program itself for example why it is needed, what it does and how it intertwines with other programs.

3.2 Naming conventions

Naming conventions are crucial in today's modern scripts/programs. Using simple arbitrary placeholders such as X or Y makes the code less intelligible and eventually just leads to confusion for you and/or future developers. Naming conventions are used to reduce the effort you and/or future developers need to ascertain and understand what your code does and what variables/class names hold.

1. Variable names should clearly represent what data the variable is storing; it should also be self-explanatory. If the variable names can't be narrowed down into just one word, the variable name has to use the multiword delimited convention, which replaces the whitespace in between the variable name words as whitespaces tend to confuse the interpreters of most languages (*Coding best practices,* 2022). This convention can be done multiple ways, for example using an underscore (_) which is called the SnakeCase e.g. number_one or the Camelcase convention which uses capital letters e.g. numberOne.

2. Naming conventions should also be applied to Class names and functions/procedure names as it should clearly describe the purpose of the code. Naming conventions also helps to clearly distinguish classes, functions/procedures from one another resulting in less confusion.

3.3 Consistent Indentations

Applying consistent indentations to code is crucial. There are several different ways to indent code in many programming languages, and by consistently indenting the same way across your whole program ensures clarity and maintainability for future developers to maintain the code. It also prevents a lot of syntax errors from arising. This is great for preventing errors and loopholes hackers can easily take advantage of in an effort to keep our data secure.

4. Conclusion

This report has analysed how intertwined our society has become with technology and why it might be a blessing but also a curse if we don't secure our software properly. It has also provided reasoning as to why best coding practices are important in protecting against cyber-attacks and in preventing vulnerabilities. This report has also gone over recommendations for best practices in coding with reasoning as to why these recommendations are on the list and how this helps you or future developers working on the code you made. In order to prevent wide-scale disruption in our most important areas of life, it is crucial developers take the time to make sure their code is impenetrable because as this report has discussed, software handles every aspect of our current daily lives.

References

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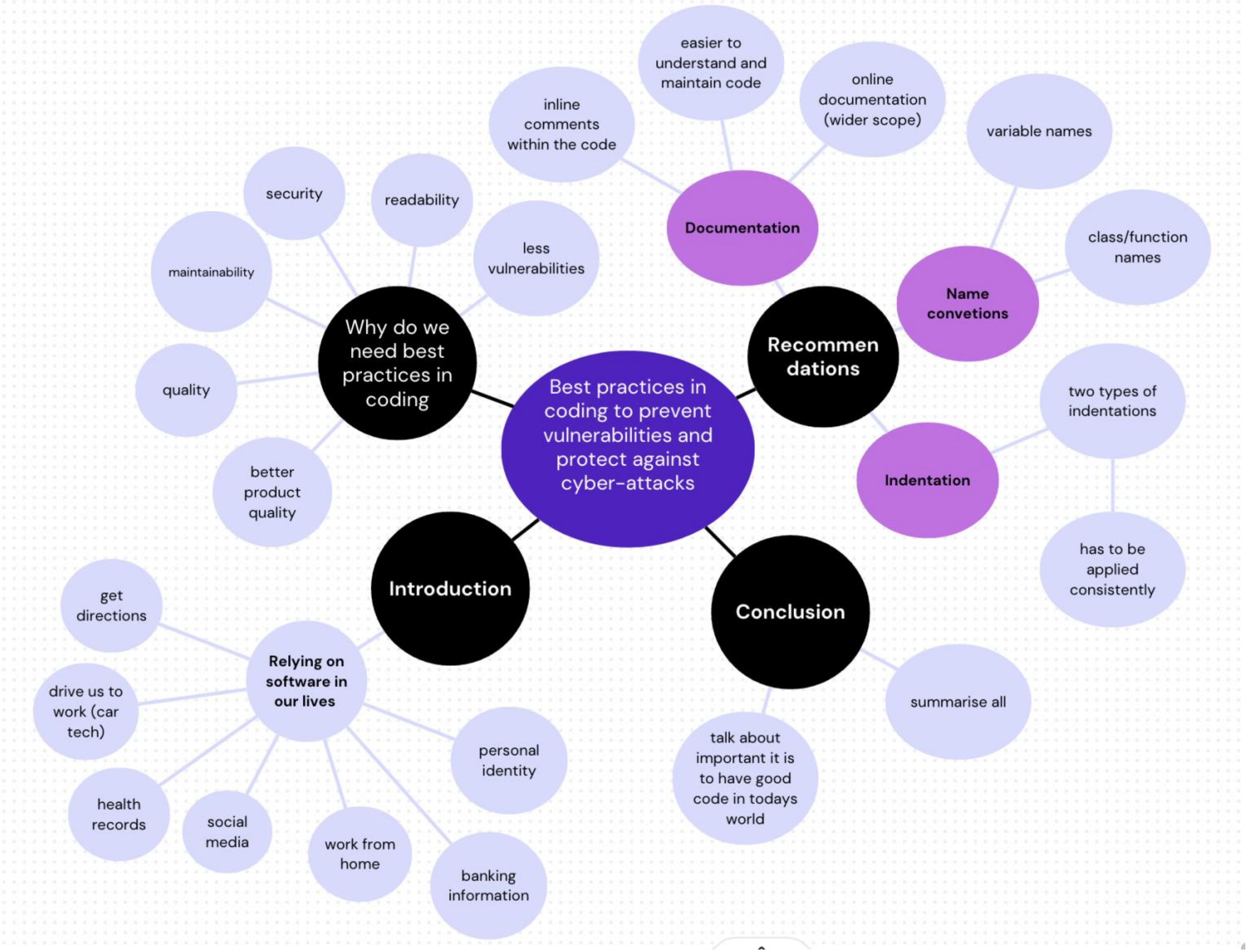
Appendix A – Mind Map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Why do we need best practices in coding
security
readability
less vulnerabilities
maintainability
quality
better product quality
Documentation
inline comments within the code
easier to understand and maintain code
online documentation (wider scope)
Recommen dations
Name convetions
variable names
class/function names
Indentation
two types of indentations
has to be applied consistently
Introduction
Relying on software in our lives
get directions
drive us to work (car tech)
health records
social media
work from home
banking information
personal identity
Conclusion
summarise all
talk about important it is to have good code in todays world