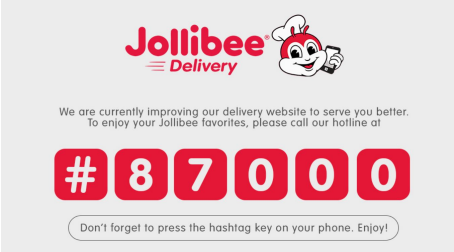
Web Application Security Introduction

If you frequently order food through the website of , you're probably disappointed to have seen the picture below when you opened their website to order .

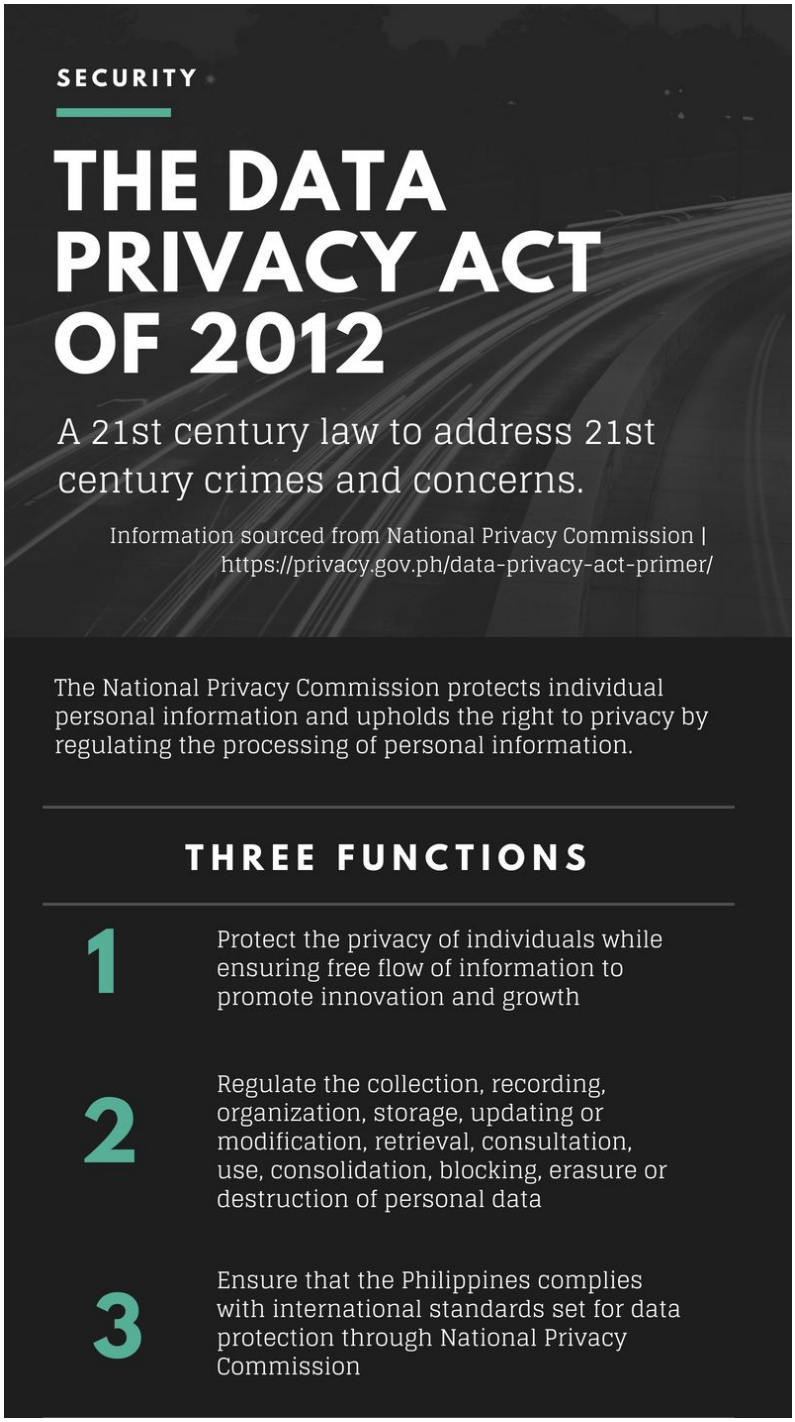


The reason behind this is the order of the National Privacy Commission to Jollibee, which is to suspend its delivery website due to its vulnerabilities. The vulnerability issues were the not updated database protection software and unencrypted information like personal customer information (ABS-CBN News, 2018).

Since the website is vulnerable to various kinds of malicious attack, hackers may directly victimize customers of the Jollibee delivery website. Hackers may look into their personal information and use it as means to conduct other fraudulent attacks. This vulnerability also affects the business owners since it might leave a negative image for the business making customer not to patronize it.

Because of the risks posed by an unsecure application or website to both service providers and customers, organizations such as the General Data Protection Regulation organization of European Union and government agencies such as the national privacy commission of the Philippines were were formed.

> *The National Privacy Commission is the country's privacy watchdog; an independent body mandated to administer and implement the Data Privacy Act of 2012, and to monitor and ensure compliance of the country with international standards set for data protection. (NPC)*



The Data Privacy Act was enforced in order to ensure the presence of security in web applications.

Web Application Security (WAS)

WAS involves the protection of web applications on the world wide web, particularly its codes which may contain vulnerabilities or risks that can be exploited for malicious purposes. Considering how almost all online services require the use of web applications, this can greatly affect the applications' functionalities and the people using them.

In relation to web application security, the Open Web Application Security publishes their top 10 list of Application Security Risks. Their most recent list is the Application Security Risk for 2017.

Top 10 (clickable only for the bolded list)

1. Injection
2. **Broken Authentication**
3. Sensitive Data Exposure
4. XML External Entities (XXE)
5. Broken Access Control
6. Security Misconfiguration
7. Cross-Site Scripting
8. Insecure Deserialization
9. **Using Components with Known Vulnerabilities**
10. **Insufficient Logging & Monitoring**

Note :
For this lesson, we will be focusing on 3 web application security. The remaining security risks will be covered soon. Come back after a week if you want to know more about the reamining security risk.

Broken Authentication

Broken authentication is a security risk which occurs when a hacker makes use of valid combinations of compromised account credentials, and try those combinations to enter a login page or any page that requires authentication, posing as an authentic user. Broken authentication is the result of poor authentication implementations. For example, session IDs are explicitly embedded in URLs, and unencrypted user data are transmitted to servers. Functions such as the *Reset or Forgot Password* are mostly exploited in this vulnerability, and are used by the attacker in order to retrieve the details of an account.

TIPS for naive/common users ?**(infographic content)**

1. create a password with at least eight characters (A-Z, a-z, 0-9, and special character)
2. Don't reuse your password
3. Logout of insted og just exiting your browser
4. ….. Check docu for more

Sample Case

A case of broken authentication occurred between October and December 2015, where nearly 9,000 user accounts of an online tax preparation service company were compromised. The attack is a credential-stuffing attack where hackers obtained a multitude of username and password credentials, and used them to enter the accounts of TaxSlayer customers. TaxSlayer LLS only noticed the attack in January 2016, when a customer of complained that hackers used their information to obtain tax refunds by filing fake tax returns with altered bank routing numbers directed to the hackers (Feigelson, J., & Bucher, W.). In order to end the attack, the TaxSlayer imposed multi-factor authentication requirements. The Federal Trade Commission, who is working on this issue, filed their final approval of settlement with TaxSlayer LLC on November 8, 2017, containing the rules TaxSlayer must follow to continue its services (FTC, 2018).

Using Components with Known Vulnerabilities

Codes nowadays tend to link to open-source external components such as modules, libraries, and frameworks. Most of the time, no standards or requisites are given which means that anyone can create, use, or edit the components as they wish. This poses a security risk, especially for companies or developers that use these components. Not every component can affect different applications in the same way. This solely depends on how deeply embedded these components are inside the software and programs that use them. As these components run on the same access level as the application that uses them, attackers can exploit vulnerable components to access sensitive information and perform tasks that can compromise the companies that use these components.

TIPS/How to mitigate

1. proper management of all dependencies and libraries are required
2. Components should be analyzed for insecure codes (such as codes unintentionally allowing users to access private files or even sensitve compueter processes)
3. remove or update old library components that may potentially be vulnerable
4. All components and/or sources should be checked for approved licenses (indicate that they have already been reviewed for security)
5. Unapproved libraries should be removed; otherwise, if the companies will decide to take the risk of using them, then there should be restricted use.

Sample Case

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Feigelson, J., & Bucher, W. (n.d.). Cybersecurity Enforcers Wake Up to Unauthorized Computer Access Via Credential Stuffing.

Insufficient Logging & Monitoring

Insufficient logging and monitoring is a situation where some user activities within the website are not recorded. It is also the case when all user activities are logged but important details such as activity, time in, time out, or even frequency of visits are not recorded. Not being able to track any suspicious activities or sensitive actions happening within an application or a system, such as change of passwords, financial transactions, or not being able to store logs, properly give way for attackers to prevent or damage security controls. The lack of logs causes security breaches to remain undetected, which allows attackers to have more time to escalate

further into the application or the system, and to further exploit stolen data. The said attacks will, in turn, result in a more difficult and longer process of repairing any damage done and/or recovering any data loss.

TIPS

1. proper logging and monitoring system must be planned and developed to track all activity within the application, suspicious or not
2. logs it generates can be easily understood and that it provides sufficient information about any activity within the application
3. Alerts concerning suspicious activities must also be ensured that they are effective enough and that an incident response and recovery plan is well established
4. a penetration test must also be conducted wherein the system will be tested if it successfully logs and monitors any activity within the application properly, including any suspicious activities. This is to test the sufficiency of the logs being generated by the logging and monitoring system (Hack2Secure, 2018).

Sample Case

An example case where the vulnerability of insufficient logging and monitoring was exploited, happened in 2013 where the German branch of Vodafone was hacked. A third-party subcontractor was reported to steal the names, addresses, bank account numbers, birthdates, and possibly phone credit card details and passwords of over 2 million customers. Though unclear of when the breach took place, it appeared that the hackers were able so successfully compromise an internal server on their network. A software which could have alerted the company of the attack as soon as the breach happened and in turn would have mitigated the breach was believed to be absent.

Injection

Injection, in the domain of web application security risks, refer to the inclusion of SQL, NoSQL, OS and LDAP codes in an application in order to make unauthorized changes to application content or unauthorized access to sensitive information.
Injection can be obtained in many different ways.

1. Given a

in order to break into or enter a system to cause an, exploit information,
obtain sensitive information and use it to , nakapasok sa isang sistema.

Example

Cross-Site Scripting

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