Security Research



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Research report

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# Summary

In this document I will look to the security aspect of my application. First I will describe the owasp top 10. Once I did that I will go deeper into 1 of the owasp problems that is the most related to my project. I will describe what this problem is and what you can do to prevent it. I will do this research according to the DOT framework.

# Introduction

The main question of this report is:

* ‘Which security problem is the most important for my personal project and how can I fix this problem?’

Before I can answer the main question I’ll have to answer some sub questions so that they clarify the main questions. These sub-questions are:

* ‘What is a security problem?’
* ‘What are the most common security problems?’
* ‘Why are these the most common security problems?’
* ‘How can you prevent this security problems?’

# What is a security problem?

Software security issues are vulnerabilities that exist within a software system, allowing malicious actors to gain unauthorized access to sensitive information, disrupt operations, or cause harm. Examples of software security issues include unpatched security flaws, inadequate authentication and authorization measures, improper data validation, lack of encryption, and insecure coding practices.

# What are the most common security problems?

## Owasp top 10

The Open Web Application Security Project (OWASP) is an international organization that focuses on developing secure applications. To help organizations improve their capability to produce secure code, the OWASP Foundation has compiled a list of the most common security errors that are still occurring and easy-to-prevent. Additionally, they have created various open-source toolsets to identify security issues within projects. These tools, documents, teaching materials, guidelines, checklists, and other resources are all available to help organizations make their applications as secure as possible.

(Owasp, 2022)

### 1. Broken Access Control

Access control is an important security measure to ensure users are only granted the permissions they are intended to have. Common access control vulnerabilities include violation of the principle of least privilege, bypassing access control checks, insecure direct object references, missing access controls for API methods, elevation of privilege, metadata manipulation, and CORS misconfiguration. All of these can lead to unauthorized information disclosure, modification, or destruction of data, or performing functions outside the user's limits.

### 2. Cryptographic Failures

Data protection is key to secure data in transit and at rest. To ensure data security, it is important to check for weak cryptographic algorithms, protocols, keys, and initialization vectors. In addition, proper key management, validation of server certificates, and securely seeded randomness are essential. Proper hash functions and padding methods should also be used to prevent attacks.

### 3. Injection

Application security is critical for protecting user data. Attackers can take advantage of vulnerabilities when user-supplied data is not properly validated, filtered, or sanitized. Common injection vulnerabilities include SQL, NoSQL, OS command, ORM, LDAP, and EL/OGNL injection. The best way to protect against these threats is to include static, dynamic, and interactive application security testing tools into the CI/CD pipeline and perform source code review.

### 4. Insecure Design

Secure design is a culture and methodology that involves threat modeling and constant evaluation of security threats to ensure robust design and testing. A secure development lifecycle must also be employed, which includes secure design patterns, a secured component library, tooling, and threat modeling. These components must be integrated from the beginning of the software project, through the build and testing stages, and into the maintenance phase. OWASP's Software Assurance Maturity Model (SAMM) can be used to help structure secure software development efforts.

### 5. Security Misconfiguration

Application security is the practice of protecting applications from external threats and malicious attacks. It involves securing code, configuration and data, as well as protecting the application from vulnerabilities that could be exploited by attackers. This is achieved through a combination of secure development processes, secure coding practices, secure configuration, and security testing. Application security is an essential component of any organization's overall security posture and should be taken seriously.

### 6. Vulnerable and Outdated Components

Software vulnerability can be a serious security risk if components used on both the client and server side, such as the operating system, applications, and libraries, are not kept up to date. Regular vulnerability scanning and subscribing to security bulletins is essential, as is testing the compatibility of updated components. Additionally, configurations must be secured to ensure safety.

### 7. Identification and Authentication Failures

The application must protect against authentication-related attacks by ensuring that user identities are properly confirmed, authenticated, and managed during a session. Weaknesses such as automated attacks, default passwords, weak credential recovery, plain text passwords, missing or ineffective multi-factor authentication, exposed session identifiers, reused session identifiers, and incorrect session ID invalidation must all be addressed in order to protect against authentication-related attacks.

### 8. Software and Data Integrity Failures

Software and data integrity failures occur when code or infrastructure does not protect against integrity violations. Examples include insecure CI/CD pipelines, auto-update functionality, and insecure deserialization. Without sufficient integrity verification, attackers could potentially upload their own updates or modify objects or data.

### 9. Security Logging and Monitoring Failures

The OWASP Top 10 2021 category of Insufficient Logging & Monitoring helps to detect, escalate, and respond to active breaches. Without logging and monitoring, breaches cannot be detected. To be protected, organizations must ensure that auditable events are logged, warnings and errors generate clear log messages, logs are monitored for suspicious activity, logs are stored securely, appropriate alerting thresholds and response processes are in place, penetration tests and scans trigger alerts, and the application can detect and alert for active attacks in real-time.

### 10. Server-Side Request Forgery(SSRF)

SSRF flaws occur when web applications fetch a remote resource without validating the user-supplied URL. This can allow an attacker to send crafted requests to unexpected destinations, even when protected by firewalls, VPNs, and other network access control lists. The increasing use of cloud services and complex architectures has made SSRF more common and more severe.

(Owasp top 10, 2022)

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