OWASP Report

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Semester:6

Introduction

This document aims to determine if the application addresses the OWASP Top 10 security risks. It will provide insights on how these risks will be covered in the application and assess whether this coverage is necessary in application.

Top 10 security risks

	Likelihood	Impact	Risk	Action possible	Planned
A01:2021-Broken Access Control	High	Severe	High	Add authentication	Yes
A02:2021-Cryptographic Failures	Unlikely	Severe	Low	Password hashing	Yes
A03:2021-Injection	Unlikely	Moderate	Low	Implement Repository Methods in Spring Data JPA	Yes
A04:2021-Insecure Design	Likely	Moderate	Moderate	Create a technical design document	Yes
A05:2021-Security Misconfiguration	High	Severe	High	Create a testing strategy and test report	N/A
A06:2021-Vulnerable and Outdated Components	Likely	Severe	Moderate	OWASP Dependency-Check	N/A
A07:2021-Identification and	Likely	Severe	High	Implement authentication testing	N/A

Authentication Failures					
A08:2021-Software and Data Integrity Failures	Unlikely	Moderate	Low	Implement Repository Methods in Spring Data JPA	Yes
A09:2021-Security Logging and Monitoring Failures	High	High	High	Implement logging across all critical components and monitoring the logs	N/A
A10:2021-Server-Side Request Forgery	High	High	High	Validate input parameters that control server-side requests	N/A

A01:2021-Broken Access Control

Reasoning: It will lead to other people finding sensitive information of a user and give access to a user that has no permission to do some function on the website for example create song on the website.

Implementation: Here is an example of a "get all users" function, which can only be accessed with the admin role. The "IsAuthenticated" annotation is custom-made with a dependency on Spring Security.

```
no usages  TonyJ3
@IsAuthenticated
@RolesAllowed({"ROLE_ADMIN"})
@GetMapping
public ResponseEntity<GetAllUsersResponse> getAllUser() { return ResponseEntity.ok(usersService.getAllUser()); }
```

```java
1 usage  TonyJ3
@Aspect
@Order(value = Ordered.HIGHEST_PRECEDENCE)
@Component
public class IsAuthenticatedAspect {
    2 usages
    private final static Logger LOGGER = LoggerFactory.getLogger(IsAuthenticatedAspect.class);

    1 usage  TonyJ3
    @Pointcut("@annotation(sem6.individualproject.users.configuration.security.isauthenticated.IsAuthenticated)")
    public void annotatedMethod() {
    }

    1 usage  TonyJ3
    @Pointcut("@within(sem6.individualproject.users.configuration.security.isauthenticated.IsAuthenticated)")
    public void annotatedClass() {
    }

    no usages  TonyJ3
    @Around("(annotatedMethod() || annotatedClass()) && execution(* *(..))")
    public Object interceptMethod(final ProceedingJoinPoint interceptedMethod) throws Throwable {
        final SecurityContext context = SecurityContextHolder.getContext();
        if (context == null) {
            LOGGER.error("No security context found. No user authenticated.");
            throw new ResponseStatusException(HttpStatus.UNAUTHORIZED);
        }
```

With Spring Security, it is necessary to configure the permissions and assign user roles to access these components.

```java
no usages  TonyJ3 *
@EnableWebSecurity
@Configuration
@AllArgsConstructor
public class WebSecurityConfig {

    //Make it better.
    no usages  TonyJ3 *
    @Bean
    public SecurityFilterChain filterChain(HttpSecurity httpSecurity) throws Exception {
        httpSecurity
                .csrf(httpSecurityCsrfConfigurer -> httpSecurityCsrfConfigurer.disable())
                .authorizeHttpRequests((authorize) -> authorize
                        .anyRequest().permitAll()
                )
                .formLogin(httpSecurityFormLoginConfigurer -> httpSecurityFormLoginConfigurer.disable());
        return httpSecurity.build();
    }

}
```

A02:2021-Cryptographic Failures

Reasoning: Passwords can be exposed to unauthorized parties. This risk is severe if users reuse the same password across multiple accounts. If an attacker obtains a user's password from one account, they could potentially gain access to all of the user's other accounts.

Implementation: Here is how I implemented password hashing using Bcrypt. Bcrypt is a widely used hashing algorithm for securing passwords.

```
String encodePassword = passwordEncoder.encode(request.getPassword());
```

The hashing is achieved by using Spring Security and configuring it to use Bcrypt hashing.

```
no usages  TonyJ3
@Configuration
public class PasswordEncoderConfig {
    no usages  TonyJ3
    @Bean
    public PasswordEncoder createBCryptPasswordEncoder(){return new BCryptPasswordEncoder();
    }
}
```

A03:2021-Injection

Reasoning: Injection vulnerabilities, such as SQL injection, can harm the database. For example, an attacker might inject an SQL statement to delete database tables or gain unauthorized access to the website by bypassing the login mechanism.

Implementation: I use Spring JPA, which provides methods that help prevent SQL injection. Here is an example of its usage. The methods are provided by Spring JPA and can be used when creating the class.

```
2 usages  TonyJ3 *
public interface UsersRepository extends JpaRepository<UsersEntity,Long> {
    1 usage  TonyJ3
    boolean existsByEmailOrUsername(String email, String username);
    1 usage  TonyJ3
    boolean existsByEmail(String email);
    1 usage  TonyJ3
    UsersEntity findByEmail(String email);
}
```

A04:2021-Insecure Design

Reasoning: Insecure design refers to the lack of security considerations during the design phase of software development. This can result in fundamental security weaknesses that are difficult or impossible to mitigate later.

Implementation: I created a technical design document that identifies any weaknesses in the application's design. This document provides an overview of how to address and improve the design later if any issues are discovered.

A05:2021-Security Misconfiguration

Reasoning: Security misconfigurations can often be prevented by thoroughly checking all configurations, though this process can be time-consuming. Implementing a testing strategy and creating test reports can streamline this process and reduce the time required to identify and correct misconfigurations.

Implementation: The testing strategy is a work in progress, and the test report has not been created yet. These tasks are planned to be completed.

A06:2021-Vulnerable and Outdated Components

Reasoning: There might be outdated dependencies in the project that need to be checked.

Implementation: The OWASP Dependency-Check has not been implemented yet but will be implemented in due time.

A07:2021-Identification and Authentication Failures

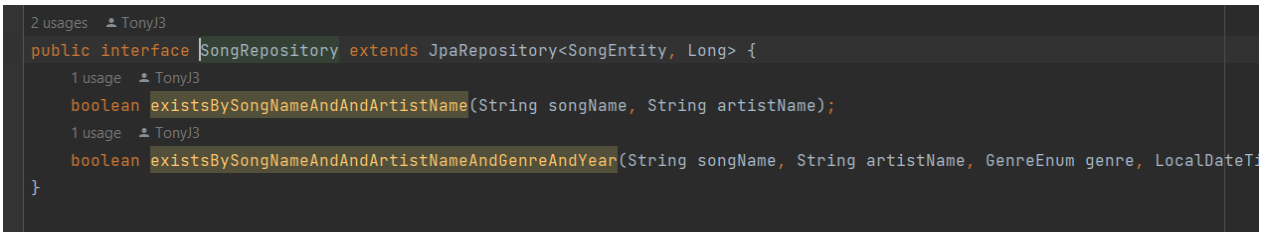
Reasoning: There is currently no authentication testing set up in the project, which is a critical gap that needs to be addressed.

Implementation: This is not yet implemented and will come in due time.

A08:2021-Software and Data Integrity Failures

Reasoning: By utilizing Spring JPA methods, which prevent data integrity failures, the data remains consistent, reliable, and accurate.

Implementation: Here is an example of the song repository implemented using Spring JPA.



A09:2021-Security Logging and Monitoring Failures

Reasoning: There is no critical logging, or any logging set up in the project, and there is also no monitoring system in place.

Implementation: Not yet implemented, it will come in due time.

A10:2021-Server-Side Request Forgery

Reasoning: There are no mechanisms currently in place to validate input parameters that control server-side requests.

Implementation: Not yet implemented, will look into it.

Conclusion

The report indicates that the application is 50% compliant with the OWASP Top 10. The remaining 50% still needs to be addressed and evaluated. Additionally the application needs to cover all the OWASP top 10.