法規掰掰！
Spring Authorization Server
的 OTP 整合快攻

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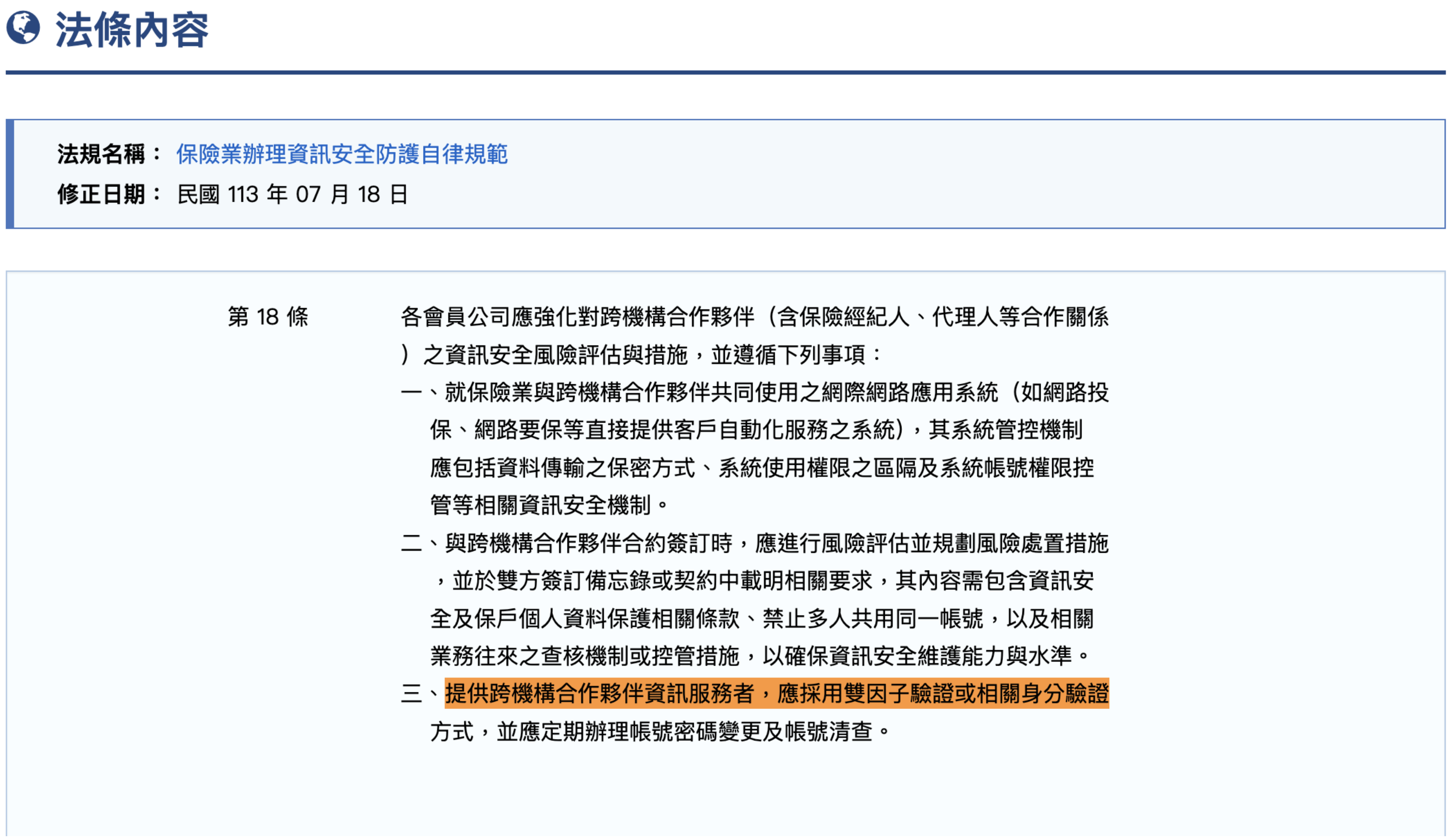
今日議程

- 背景: 為何需要 2FA 與 OIDC code flow 簡介
- 起點: 如何快速啟動一個 Spring-Authorization-Server with OIDC
- 預設行為: Spring 預設的登入流程是什麼樣子？
- 挑戰: 我們該在哪裡「插隊」加入 2FA？
- 解決方案: 一個針對 Form Login 的快速實現

TQRCG

Why I need 2FA ?



法條內容

法規名稱： 保險業辦理資訊安全防護自律規範
修正日期： 民國 113 年 07 月 18 日

第 18 條

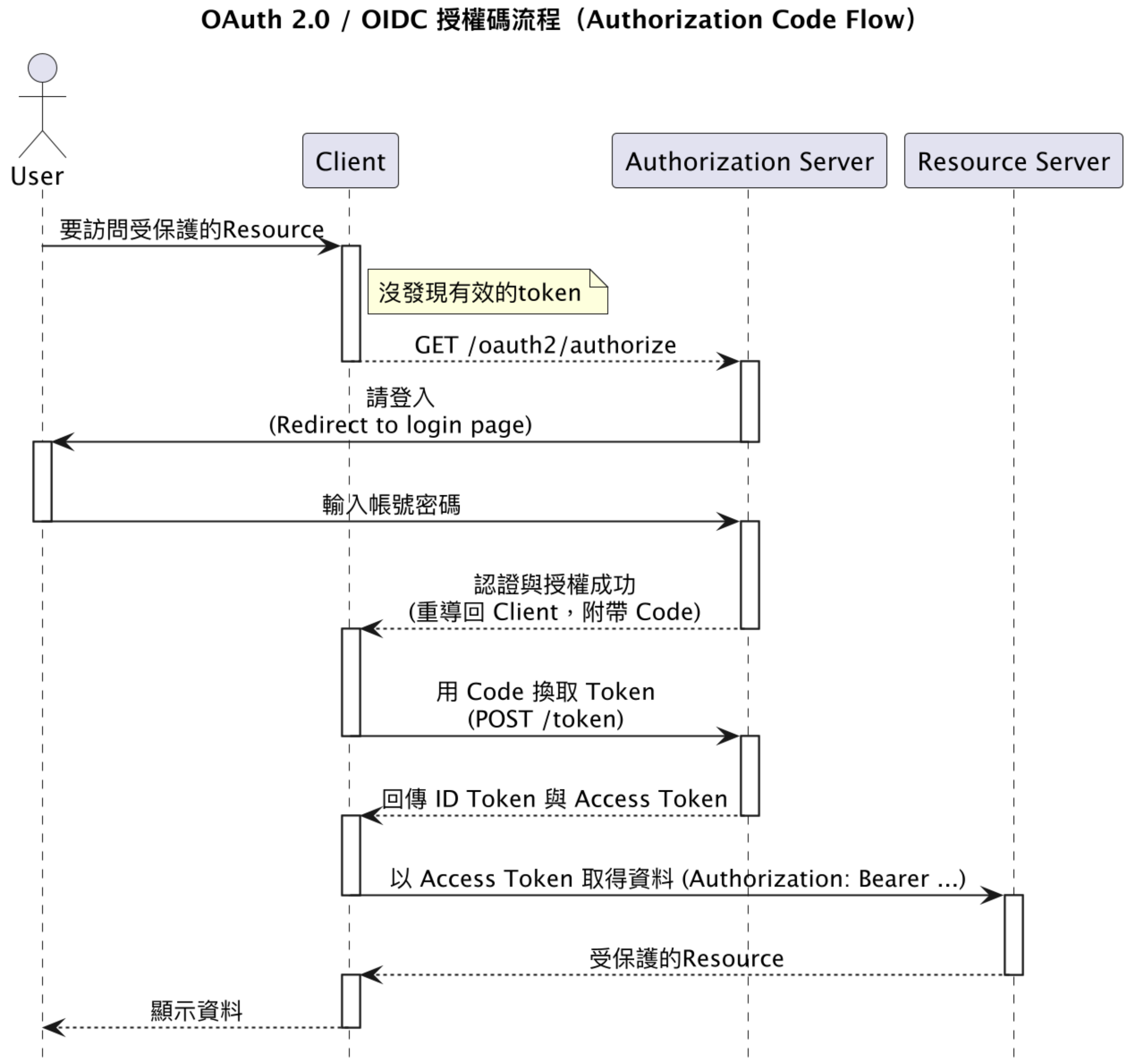
各會員公司應強化對跨機構合作夥伴（含保險經紀人、代理人等合作關係）之資訊安全風險評估與措施，並遵循下列事項：

一、就保險業與跨機構合作夥伴共同使用之網際網路應用系統（如網路投保、網路要保等直接提供客戶自動化服務之系統），其系統管控機制應包括資料傳輸之保密方式、系統使用權限之區隔及系統帳號權限控管等相關資訊安全機制。

二、與跨機構合作夥伴合約簽訂時，應進行風險評估並規劃風險處置措施，並於雙方簽訂備忘錄或契約中載明相關要求，其內容需包含資訊安全及保戶個人資料保護相關條款、禁止多人共用同一帳號，以及相關業務往來之查核機制或控管措施，以確保資訊安全維護能力與水準。

三、提供跨機構合作夥伴資訊服務者，應採用雙因子驗證或相關身分驗證方式，並應定期辦理帳號密碼變更及帳號清查。

OIDC Authorization Code Flow 概覽



Why Spring-Authorization-Server ?

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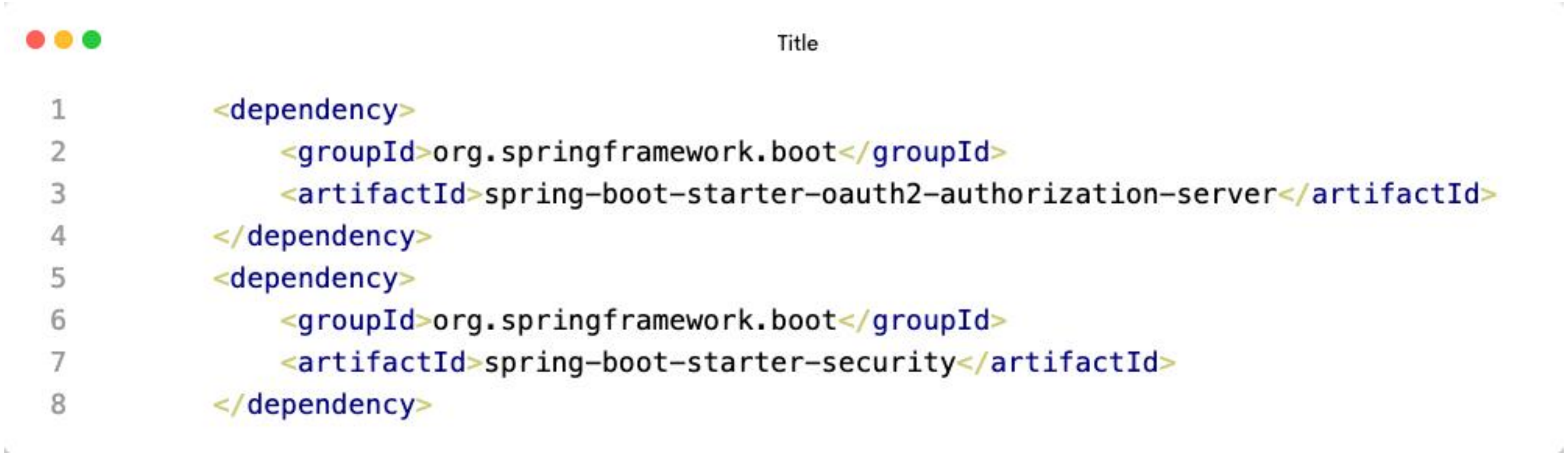
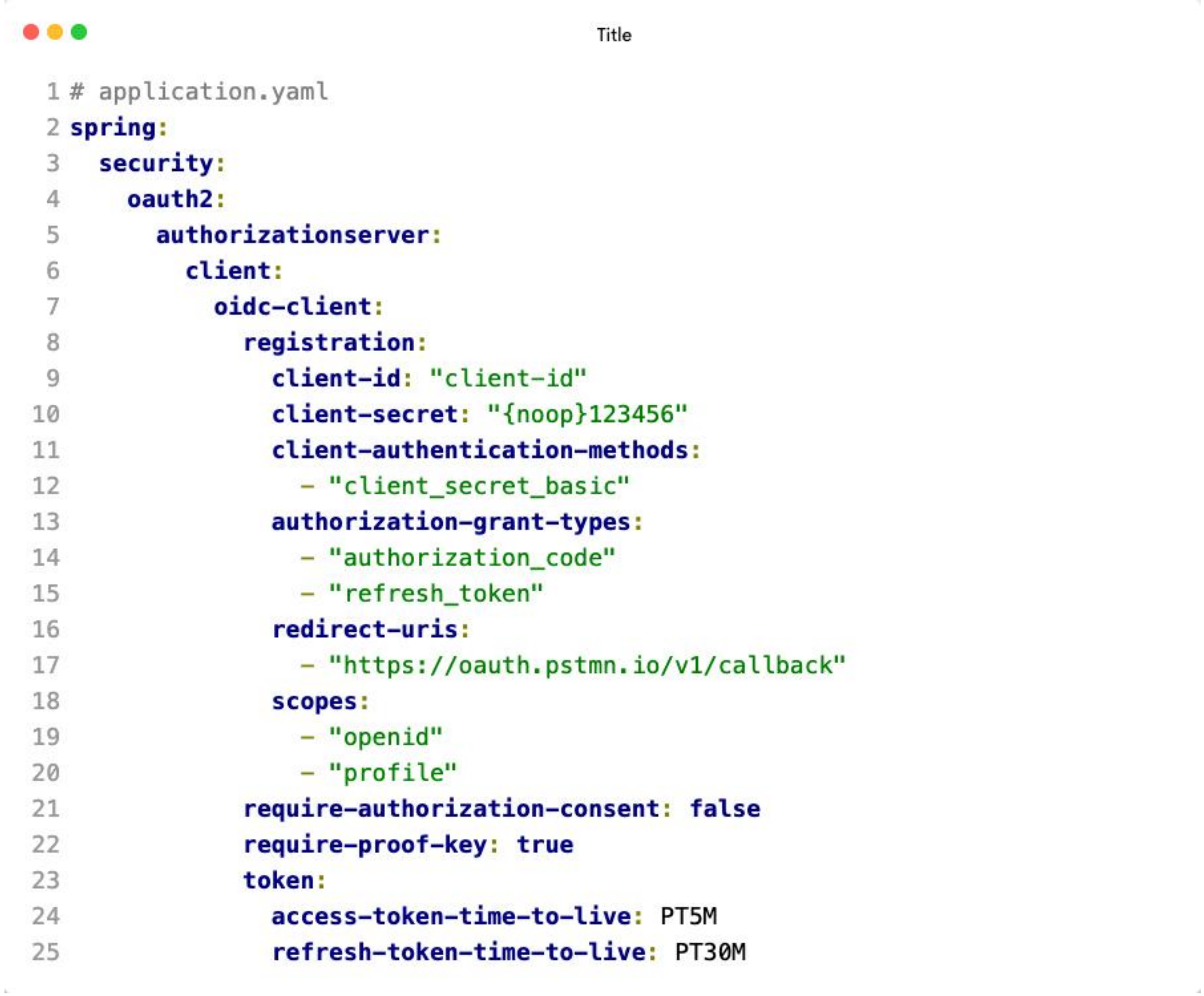
KEYCLOAK

快速啟用 OIDC Server

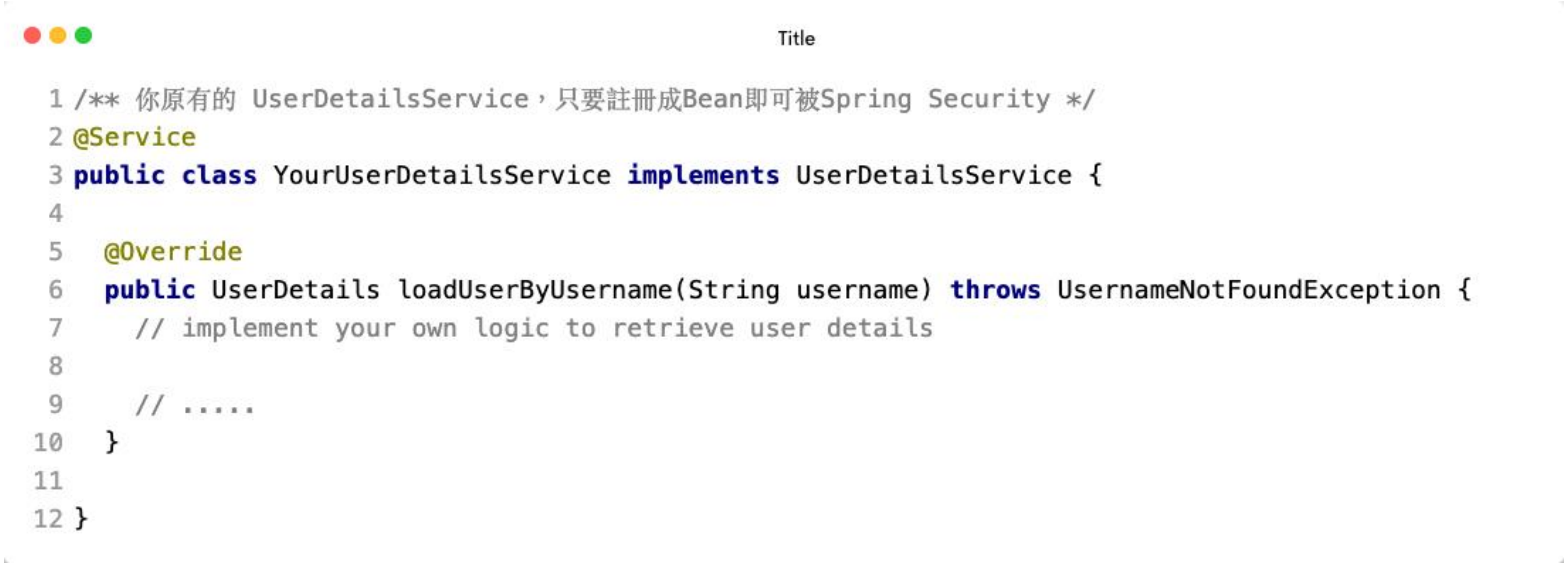


```xml
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-oauth2-authorization-server</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-security</artifactId>
</dependency>
```



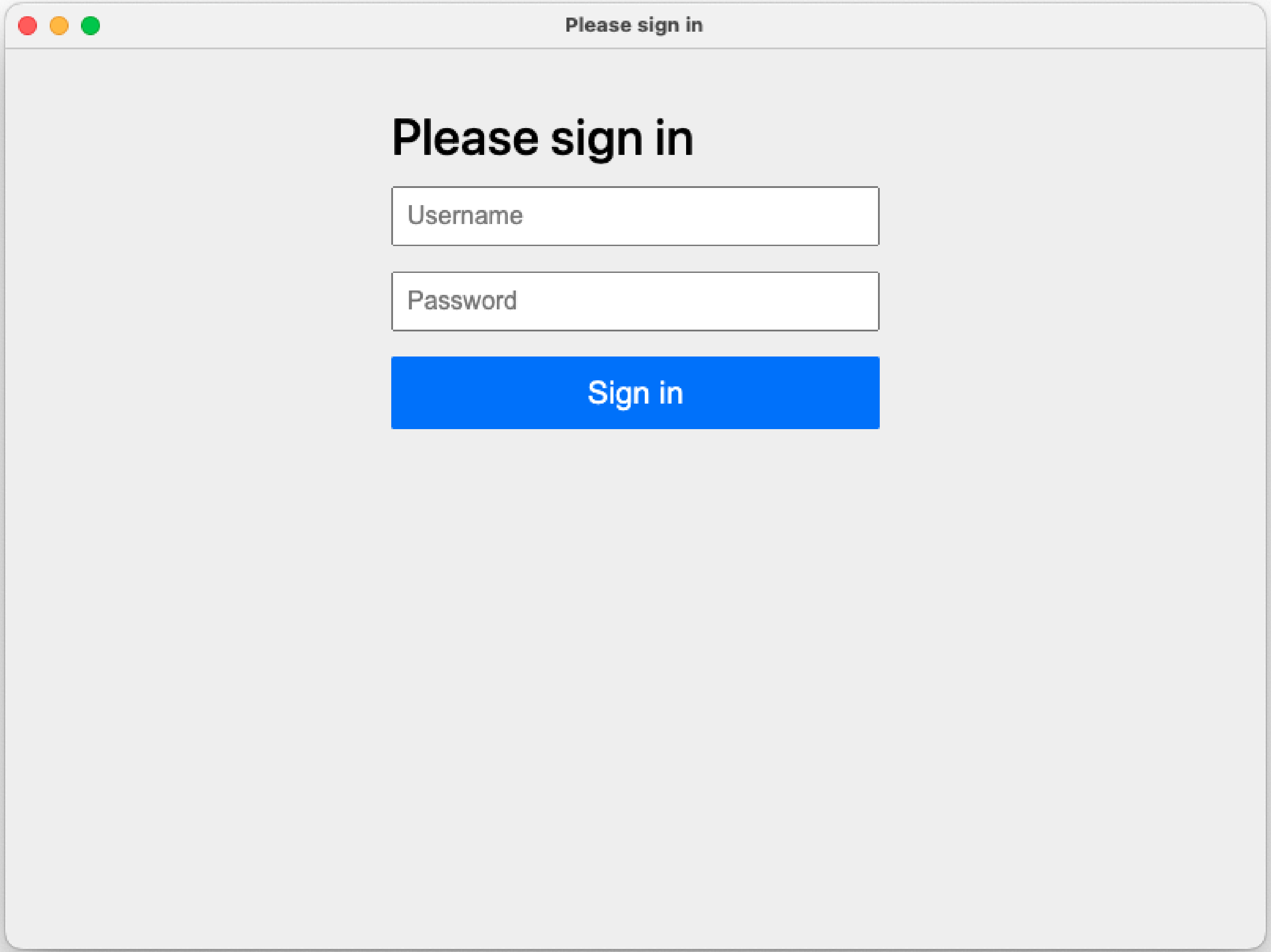
```yaml
# application.yaml
spring:
  security:
    oauth2:
      authorizationserver:
        client:
          oidc-client:
            registration:
              client-id: "client-id"
              client-secret: "{noop}123456"
              client-authentication-methods:
                - "client_secret_basic"
              authorization-grant-types:
                - "authorization_code"
                - "refresh_token"
              redirect-uris:
                - "https://oauth.pstmn.io/v1/callback"
              scopes:
                - "openid"
                - "profile"
            require-authorization-consent: false
            require-proof-key: true
            token:
              access-token-time-to-live: PT5M
              refresh-token-time-to-live: PT30M
```

UserDetailsService

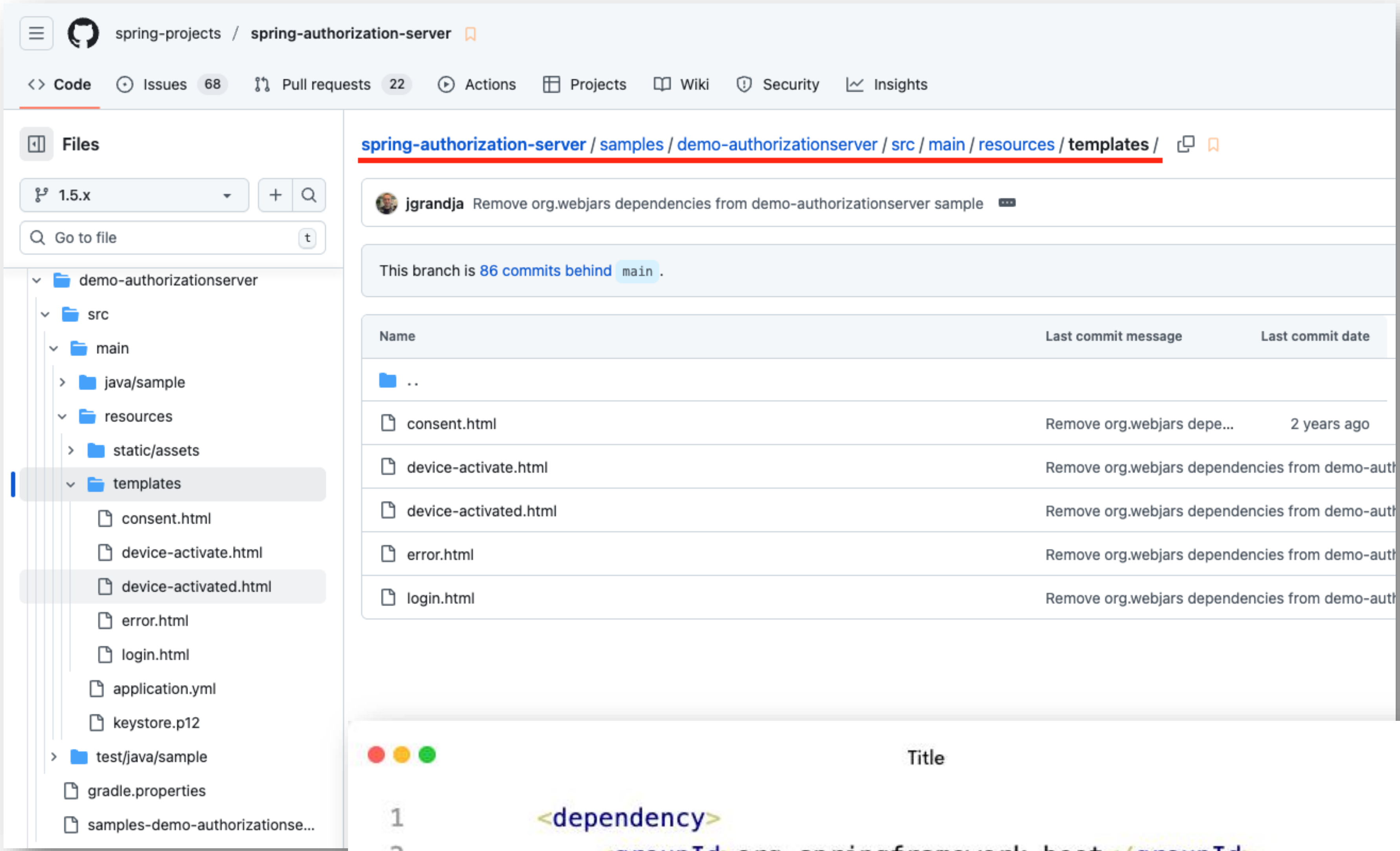


```java
/** 你原有的 UserDetailsService，只要註冊成Bean即可被Spring Security */
@Service
public class YourUserDetailsService implements UserDetailsService {

  @Override
  public UserDetails loadUserByUsername(String username) throws UsernameNotFoundException {
    // implement your own logic to retrieve user details

    // .....
  }

}
```

Default Login Page



Please sign in


spring-projects / spring-authorization-server

Code · Issues 68 · Pull requests 22 · Actions · Projects · Wiki · Security · Insights

Files

1.5.x

Go to file

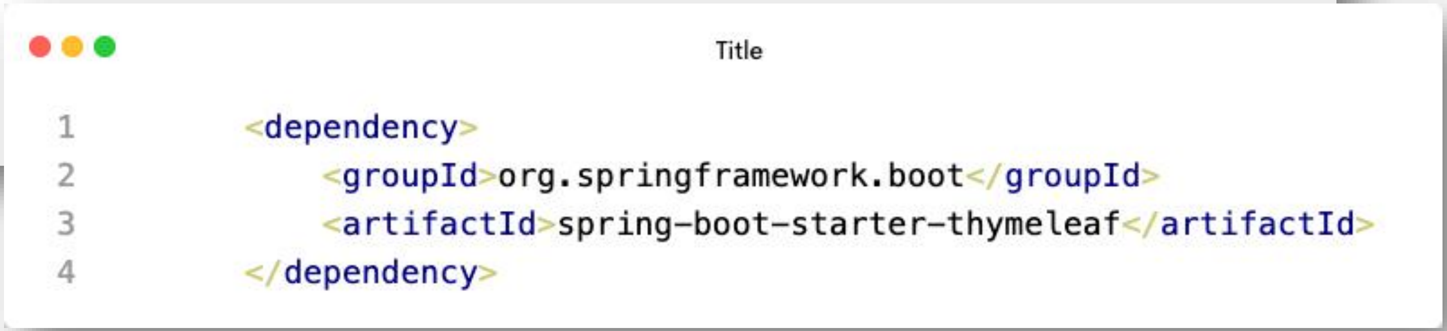
- demo-authorizationserver
  - src
    - main
      - java/sample
      - resources
        - static/assets
        - templates
          - consent.html
          - device-activate.html
          - device-activated.html
          - error.html
          - login.html
        - application.yml
        - keystore.p12
    - test/java/sample
  - gradle.properties
  - samples-demo-authorizationse...

spring-authorization-server / samples / demo-authorizationserver / src / main / resources / templates /

jgrandja Remove org.webjars dependencies from demo-authorizationserver sample

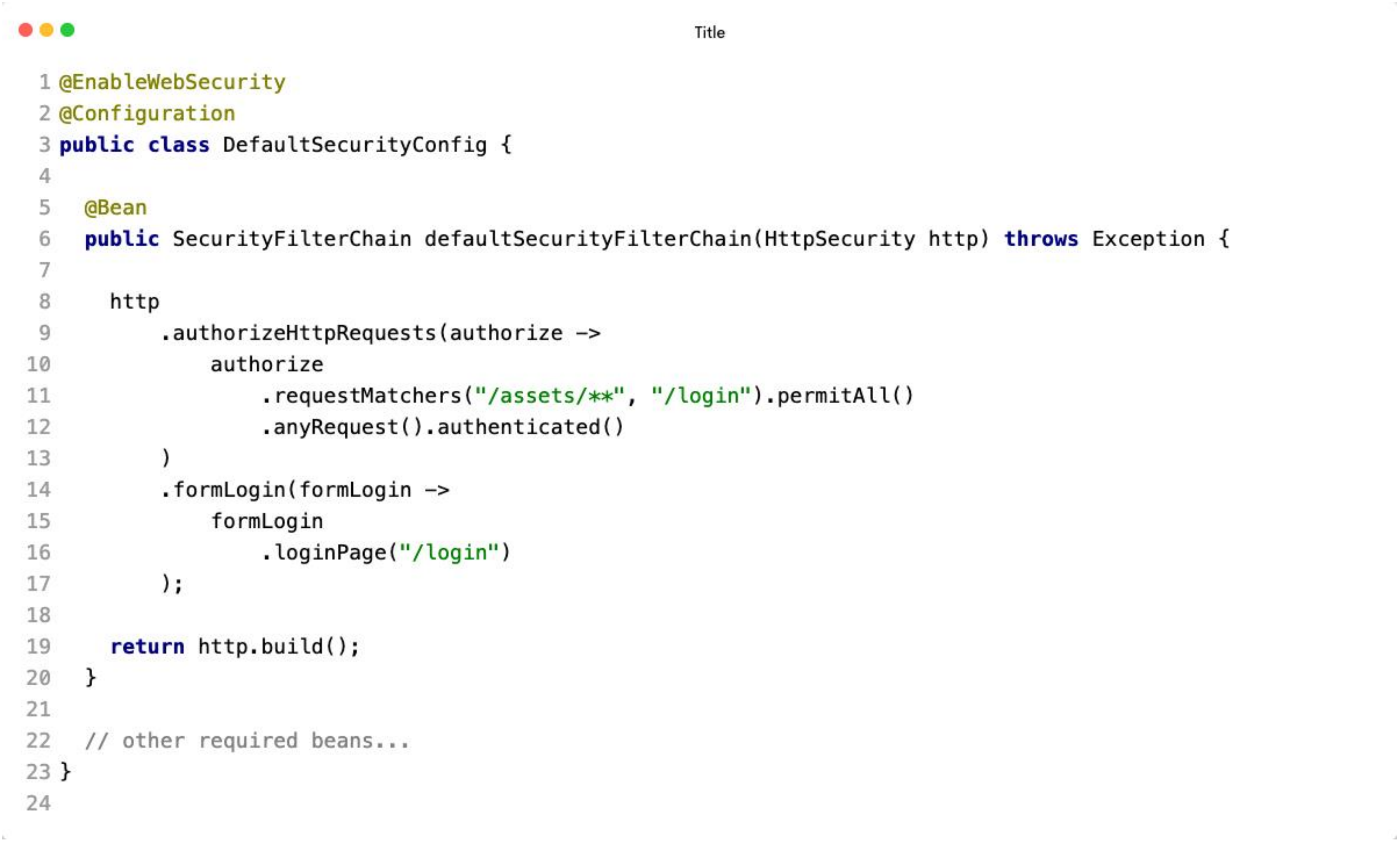
This branch is 86 commits behind main.

Name	Last commit message	Last commit date
..		
consent.html	Remove org.webjars depe...	2 years ago
device-activate.html	Remove org.webjars dependencies from demo-auth	
device-activated.html	Remove org.webjars dependencies from demo-auth	
error.html	Remove org.webjars dependencies from demo-auth	
login.html	Remove org.webjars dependencies from demo-auth	

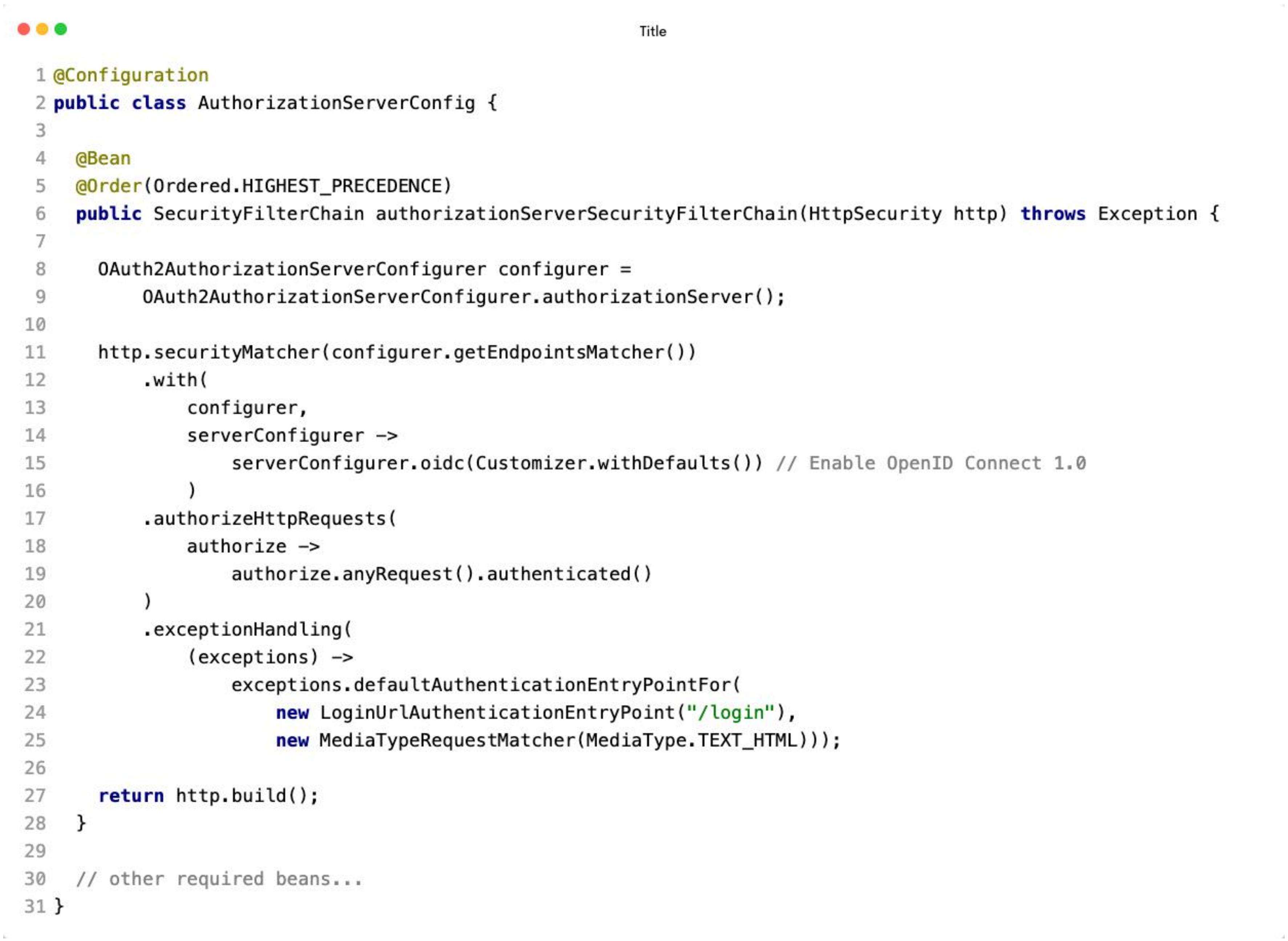

Title

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-thymeleaf</artifactId>
</dependency>
```

DefaultSecurityFilterChain for login page



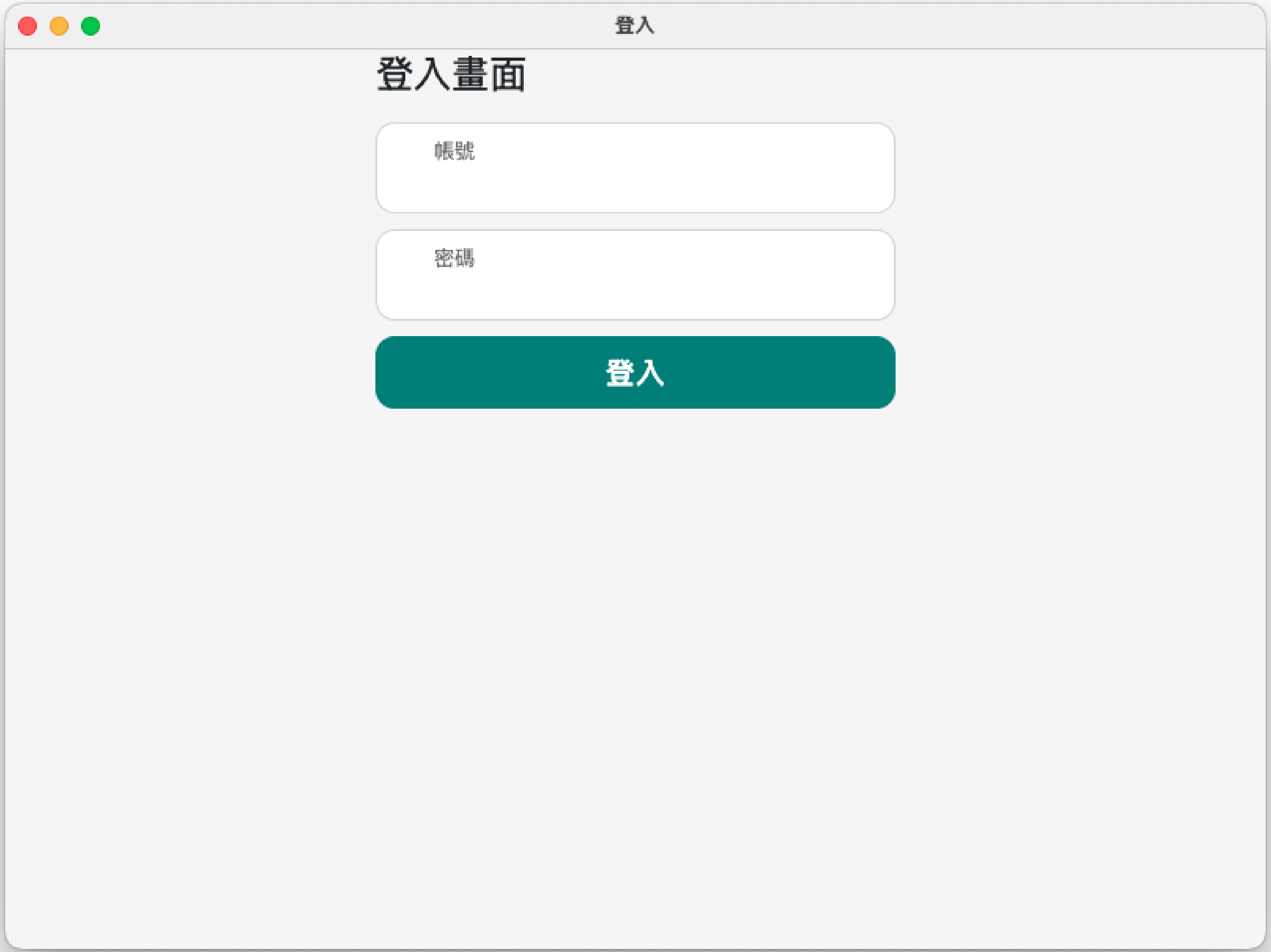
```java
@EnableWebSecurity
@Configuration
public class DefaultSecurityConfig {

  @Bean
  public SecurityFilterChain defaultSecurityFilterChain(HttpSecurity http) throws Exception {

    http
        .authorizeHttpRequests(authorize ->
            authorize
                .requestMatchers("/assets/**", "/login").permitAll()
                .anyRequest().authenticated()
        )
        .formLogin(formLogin ->
            formLogin
                .loginPage("/login")
        );

    return http.build();
  }

  // other required beans...
}

```



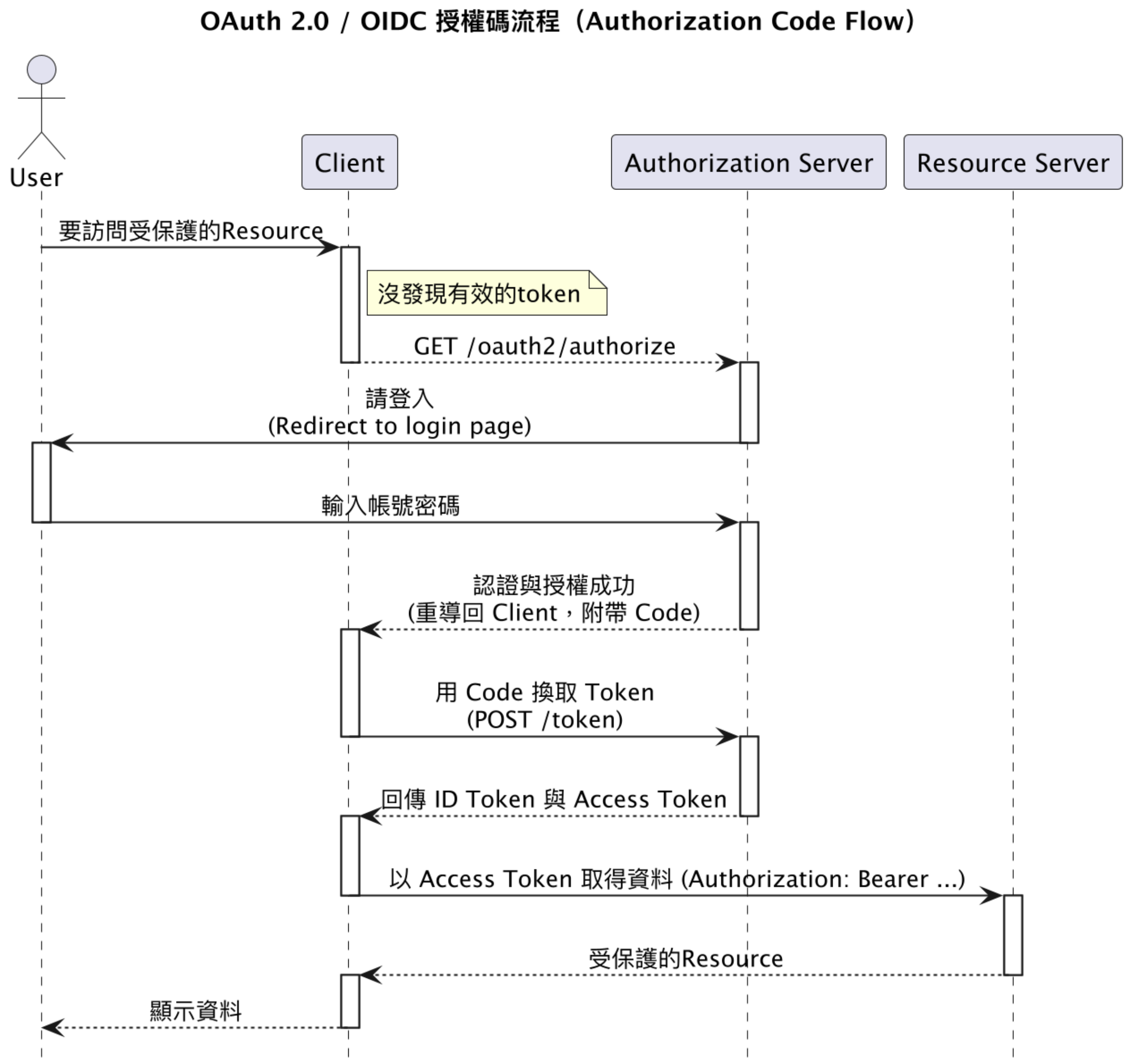
Title

```java
@Configuration
public class AuthorizationServerConfig {

  @Bean
  @Order(Ordered.HIGHEST_PRECEDENCE)
  public SecurityFilterChain authorizationServerSecurityFilterChain(HttpSecurity http) throws Exception {

    OAuth2AuthorizationServerConfigurer configurer =
        OAuth2AuthorizationServerConfigurer.authorizationServer();

    http.securityMatcher(configurer.getEndpointsMatcher())
        .with(
            configurer,
            serverConfigurer ->
                serverConfigurer.oidc(Customizer.withDefaults()) // Enable OpenID Connect 1.0
            )
        .authorizeHttpRequests(
            authorize ->
                authorize.anyRequest().authenticated()
        )
        .exceptionHandling(
            (exceptions) ->
                exceptions.defaultAuthenticationEntryPointFor(
                    new LoginUrlAuthenticationEntryPoint("/login"),
                    new MediaTypeRequestMatcher(MediaType.TEXT_HTML)));

    return http.build();
  }

  // other required beans...
}
```

自己的登入畫面



OIDC Authorization Code Flow 概覽



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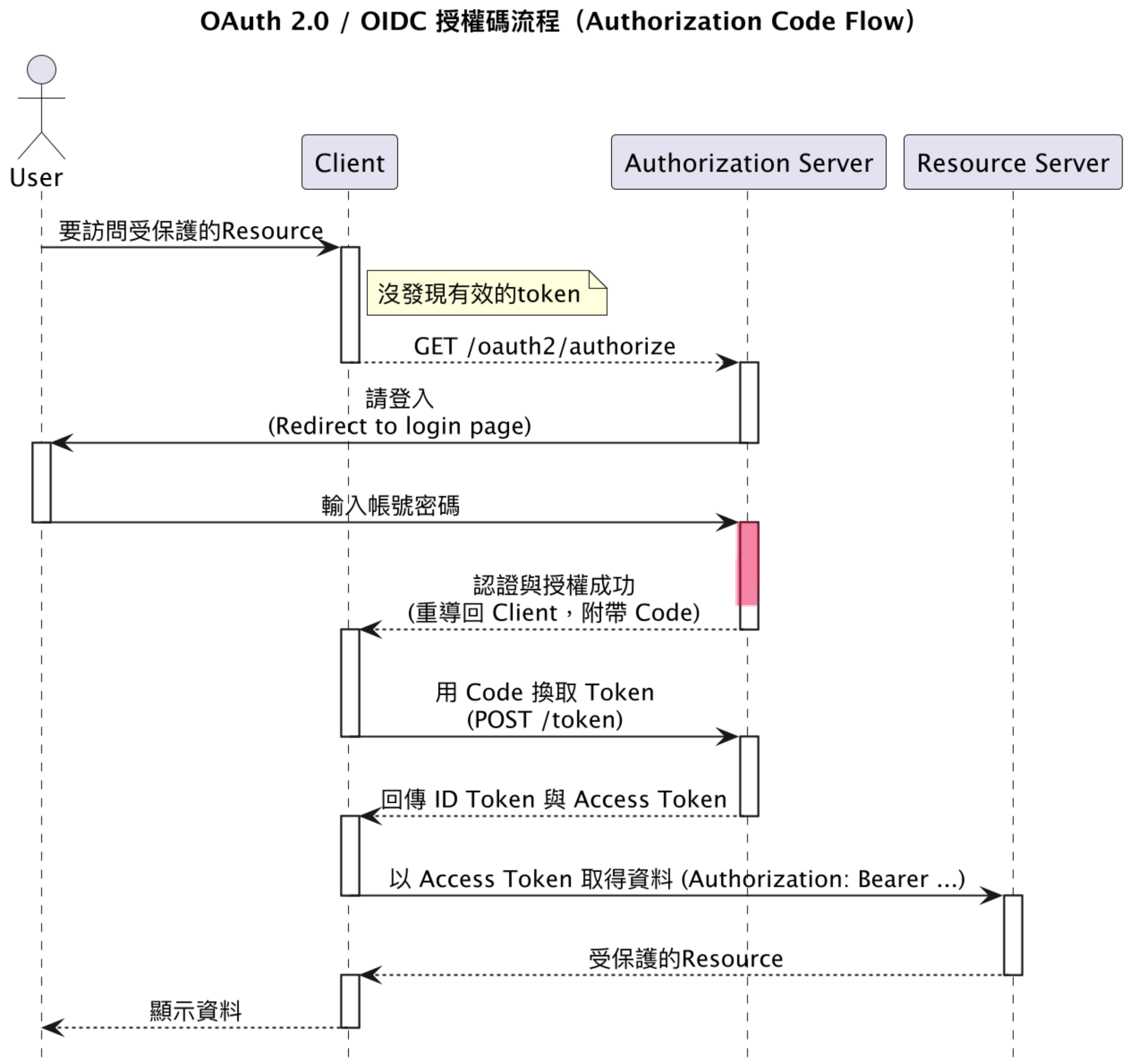
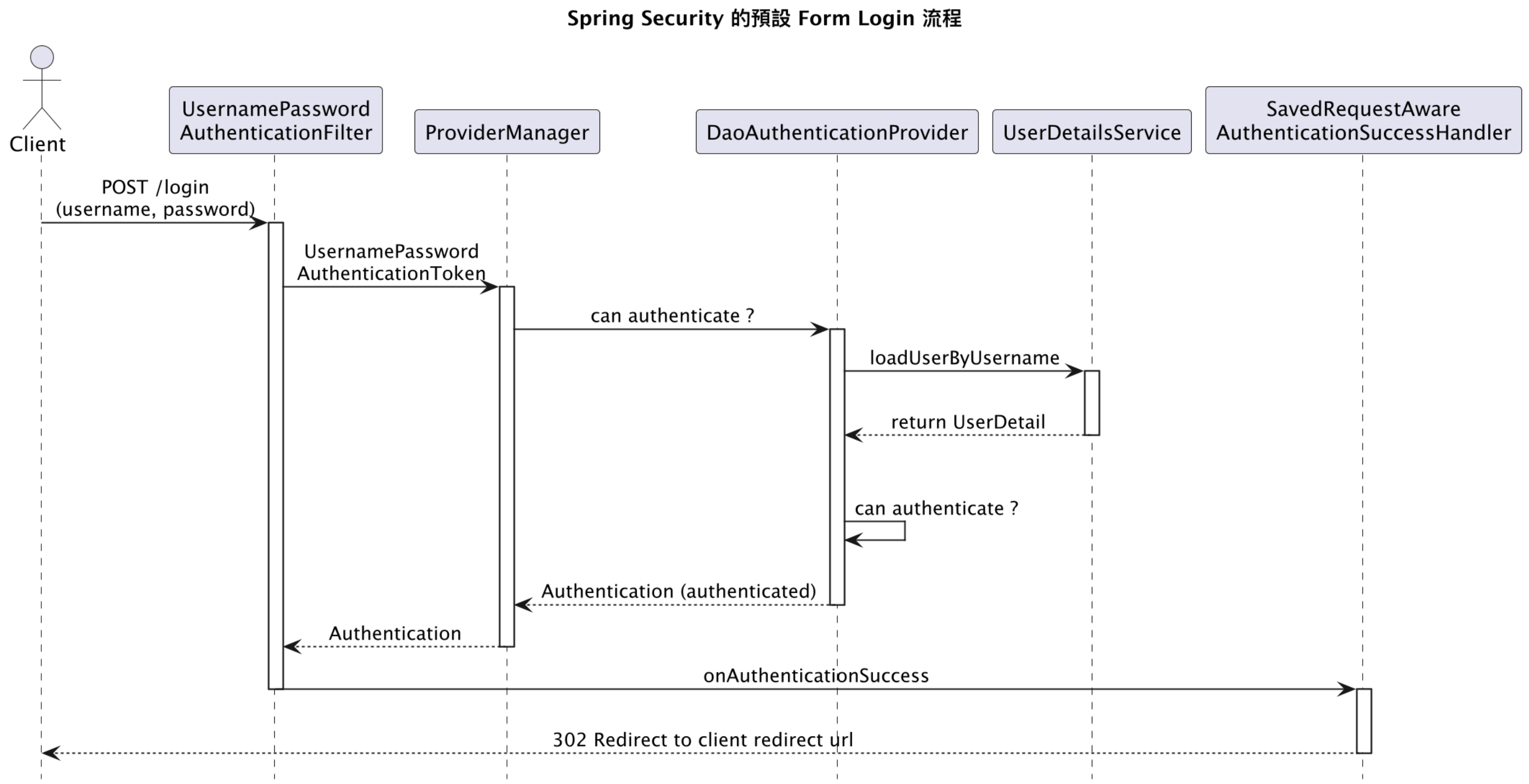
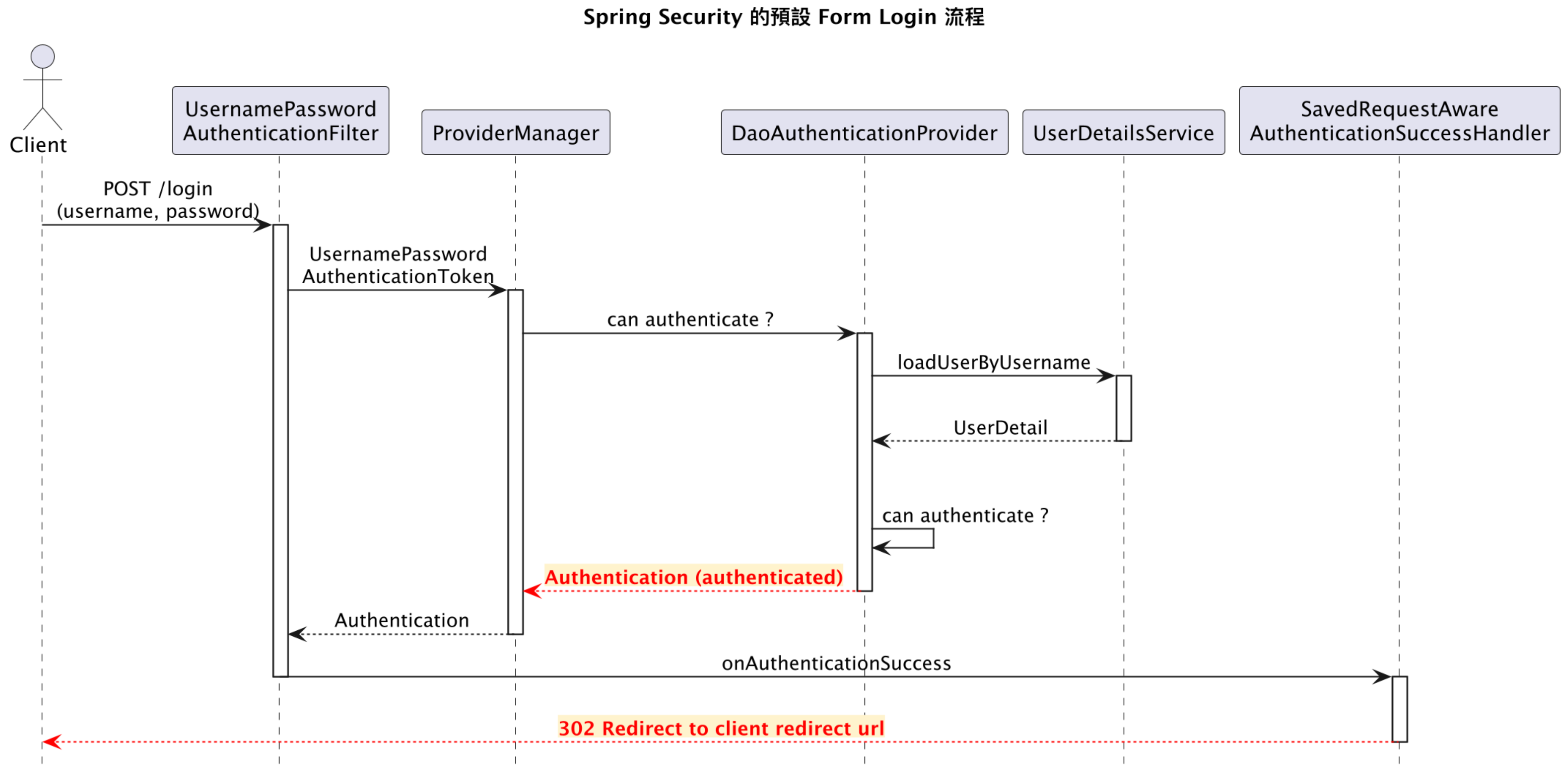


Spring Security 的預設 Form Login 流程


Spring Security 的預設 Form Login 流程
Client
UsernamePassword AuthenticationFilter
ProviderManager
DaoAuthenticationProvider
UserDetailsService
SavedRequestAware AuthenticationSuccessHandler
POST /login (username, password)
UsernamePassword AuthenticationToken
can authenticate ?
loadUserByUsername
return UserDetail
can authenticate ?
Authentication (authenticated)
Authentication
onAuthenticationSuccess
302 Redirect to client redirect url

Spring Security 的預設 Form Login 流程



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UserDetail
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Authentication (authenticated)
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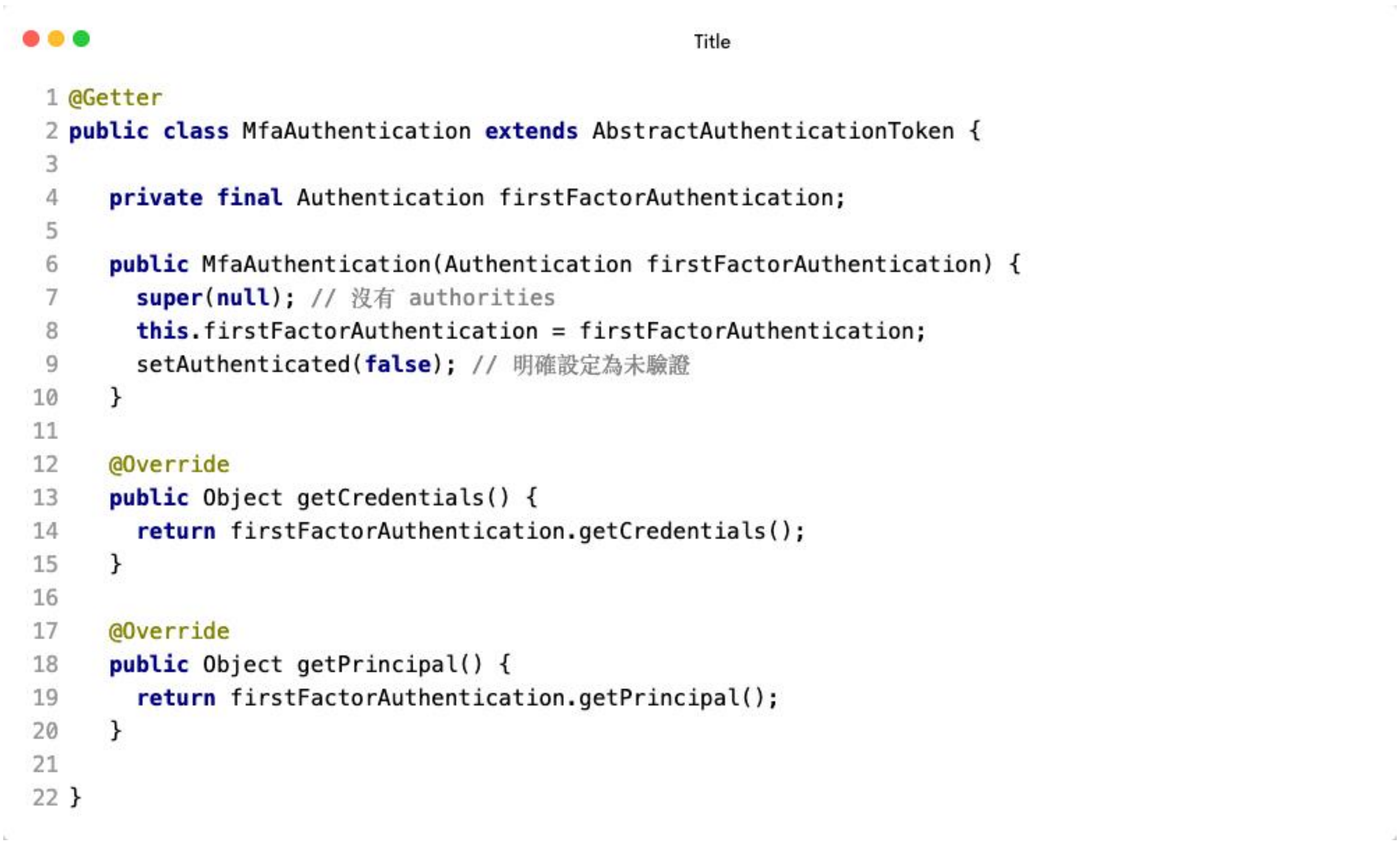
302 Redirect to client redirect url

解決方案：客製化核心元件

- **CustomAuthenticationProvider:**
  - 取代預設的 DaoAuthenticationProvider。
  - 職責：只驗證帳號密碼。成功後，不回傳「完全認證」的 Authentication，而是回傳一個自訂的、**「半認證」**的 MfaAuthentication 物件。

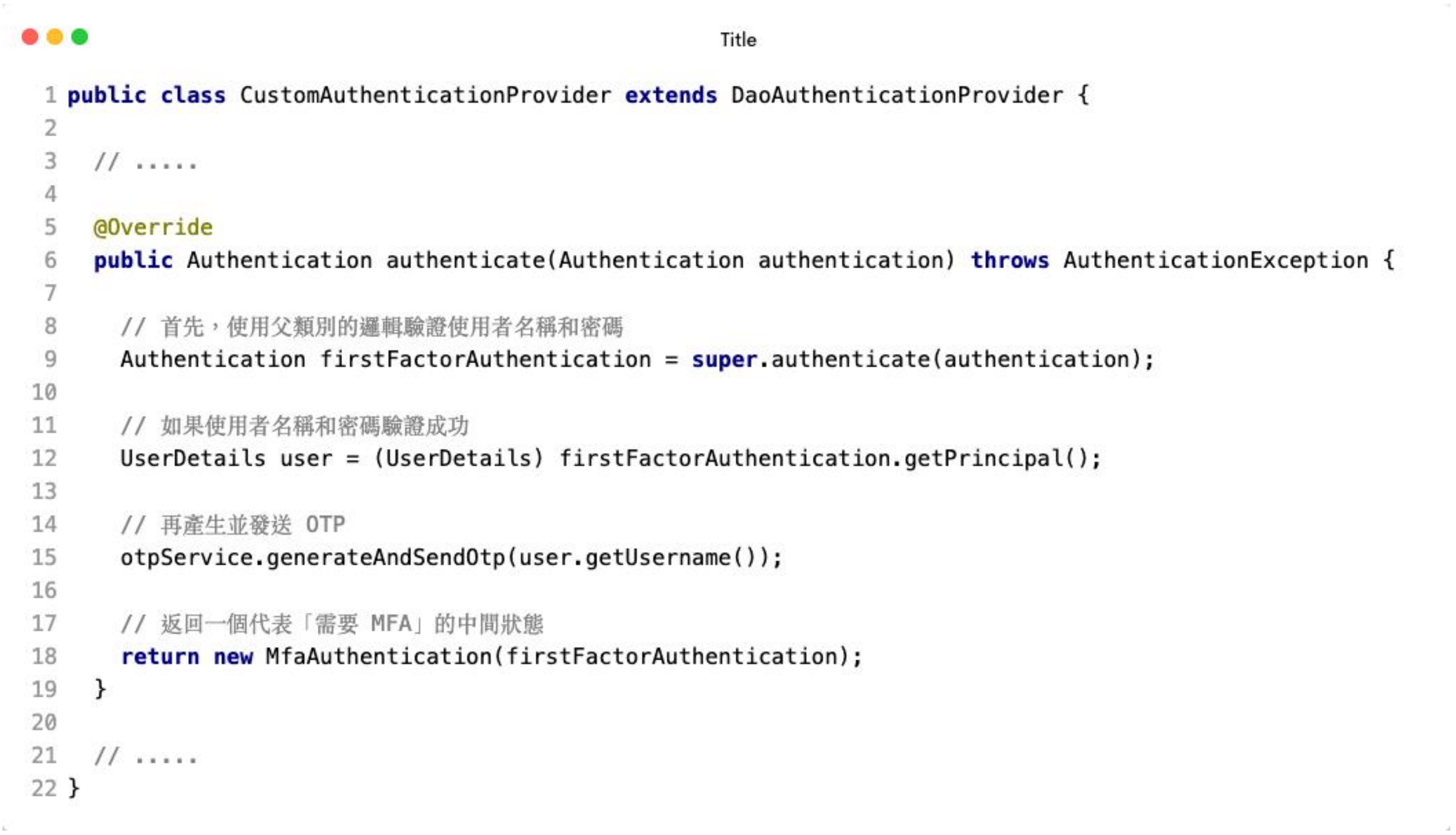
- **CustomLoginSuccessHandler**:
  - 取代預設的SavedRequestAwareAuthenticationSuccessHandler。
  - 職責：不讓他去原本要去的地方，改去mfa驗證畫面。

自訂的MfaAuthentication


Title

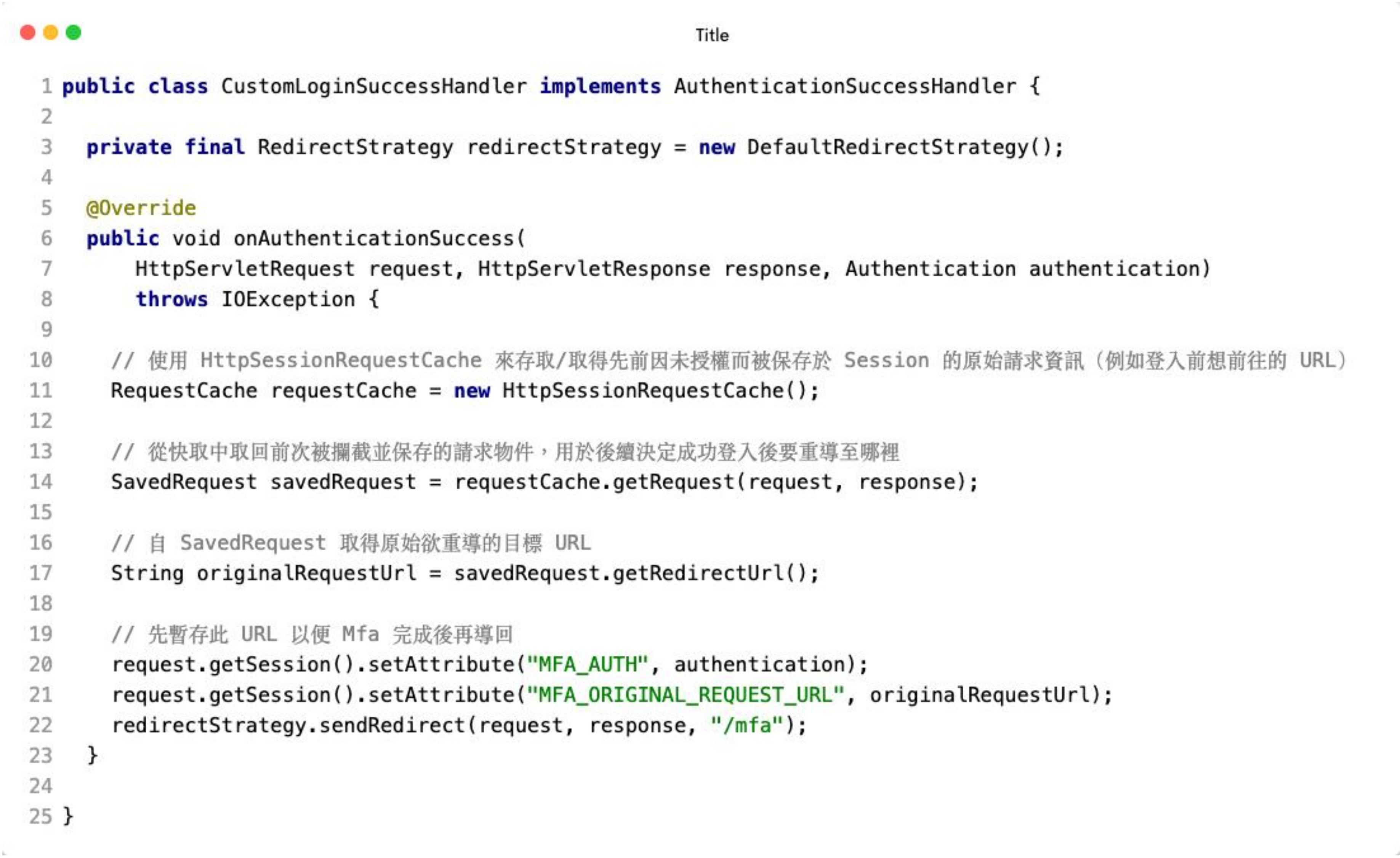
```java
@Getter
public class MfaAuthentication extends AbstractAuthenticationToken {

   private final Authentication firstFactorAuthentication;

   public MfaAuthentication(Authentication firstFactorAuthentication) {
     super(null); // 沒有 authorities
     this.firstFactorAuthentication = firstFactorAuthentication;
     setAuthenticated(false); // 明確設定為未驗證
   }

   @Override
   public Object getCredentials() {
     return firstFactorAuthentication.getCredentials();
   }

   @Override
   public Object getPrincipal() {
     return firstFactorAuthentication.getPrincipal();
   }

}
```

CustomAuthenticationProvider


Title

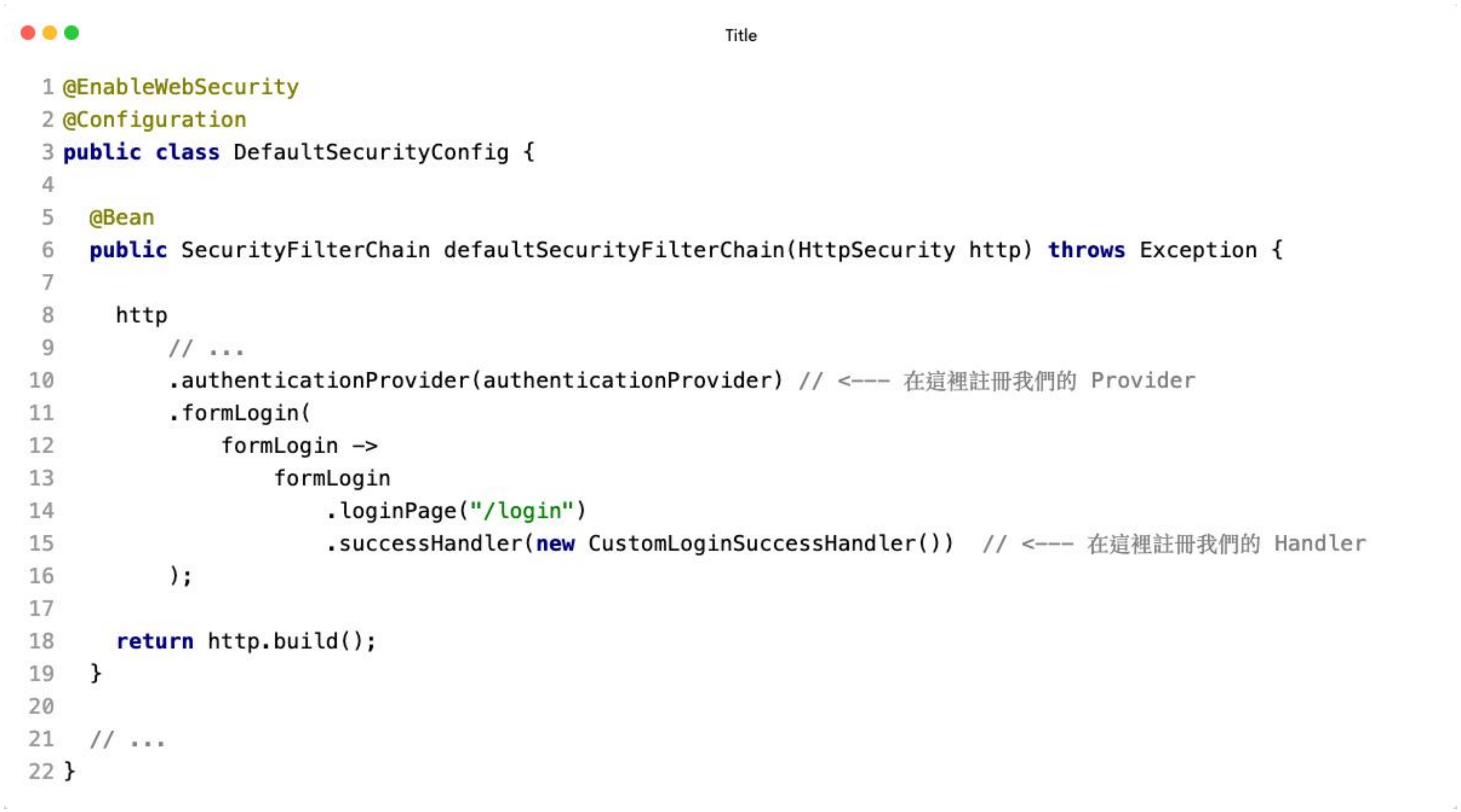
```java
public class CustomAuthenticationProvider extends DaoAuthenticationProvider {

  // .....

  @Override
  public Authentication authenticate(Authentication authentication) throws AuthenticationException {

    // 首先，使用父類別的邏輯驗證使用者名稱和密碼
    Authentication firstFactorAuthentication = super.authenticate(authentication);

    // 如果使用者名稱和密碼驗證成功
    UserDetails user = (UserDetails) firstFactorAuthentication.getPrincipal();

    // 再產生並發送 OTP
    otpService.generateAndSendOtp(user.getUsername());

    // 返回一個代表「需要 MFA」的中間狀態
    return new MfaAuthentication(firstFactorAuthentication);
  }

  // .....
}
```

CustomLoginSuccessHandler



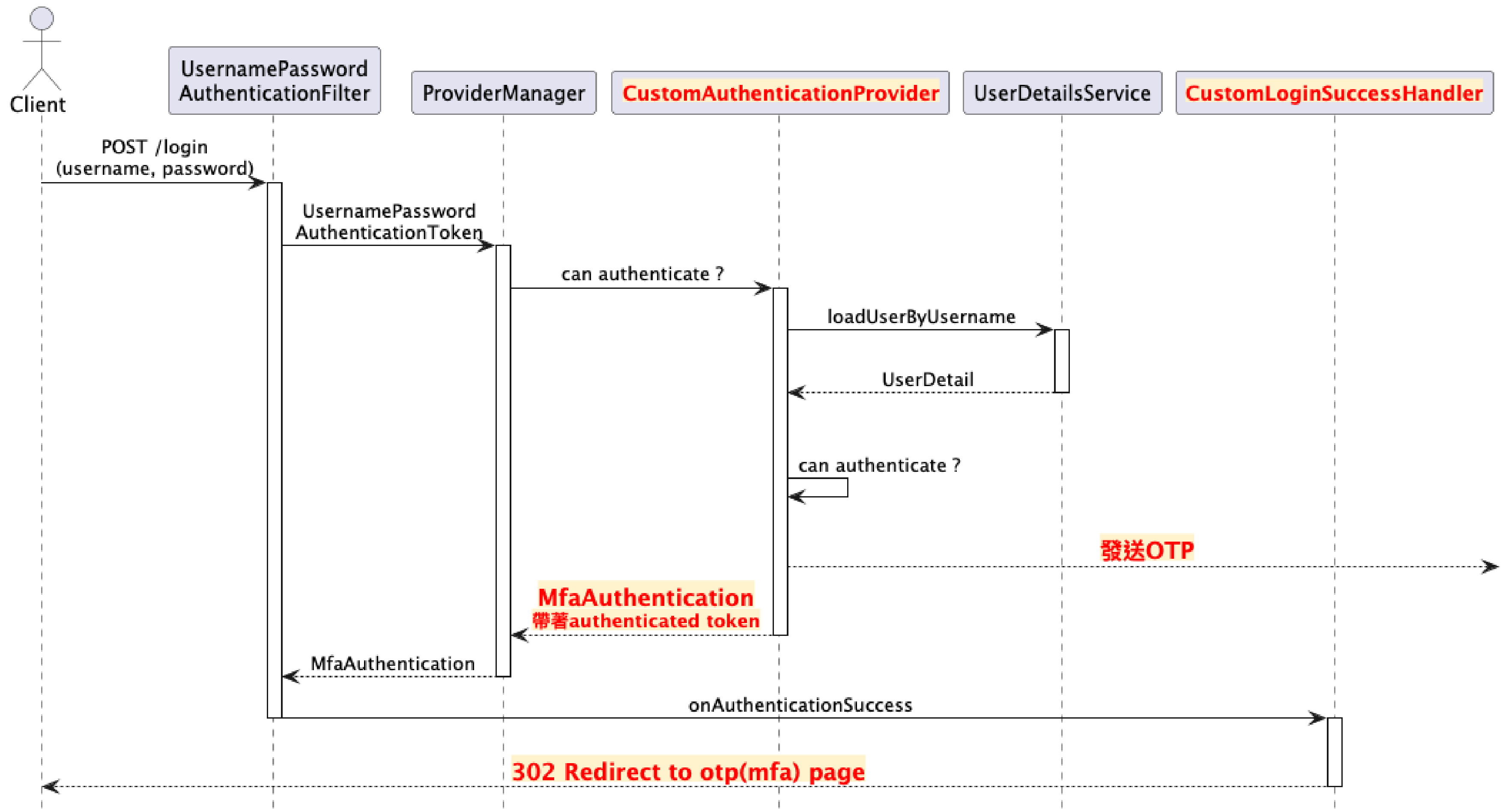
```java
public class CustomLoginSuccessHandler implements AuthenticationSuccessHandler {

  private final RedirectStrategy redirectStrategy = new DefaultRedirectStrategy();

  @Override
  public void onAuthenticationSuccess(
      HttpServletRequest request, HttpServletResponse response, Authentication authentication)
      throws IOException {

    // 使用 HttpSessionRequestCache 來存取/取得先前因未授權而被保存於 Session 的原始請求資訊（例如登入前想前往的 URL）
    RequestCache requestCache = new HttpSessionRequestCache();

    // 從快取中取回前次被攔截並保存的請求物件，用於後續決定成功登入後要重導至哪裡
    SavedRequest savedRequest = requestCache.getRequest(request, response);

    // 自 SavedRequest 取得原始欲重導的目標 URL
    String originalRequestUrl = savedRequest.getRedirectUrl();

    // 先暫存此 URL 以便 Mfa 完成後再導回
    request.getSession().setAttribute("MFA_AUTH", authentication);
    request.getSession().setAttribute("MFA_ORIGINAL_REQUEST_URL", originalRequestUrl);
    redirectStrategy.sendRedirect(request, response, "/mfa");
  }

}
```

啟用我們的客製元件


Title

```java
@EnableWebSecurity
@Configuration
public class DefaultSecurityConfig {

  @Bean
  public SecurityFilterChain defaultSecurityFilterChain(HttpSecurity http) throws Exception {

    http
        // ...
        .authenticationProvider(authenticationProvider) // <--- 在這裡註冊我們的 Provider
        .formLogin(
            formLogin ->
                formLogin
                    .loginPage("/login")
                    .successHandler(new CustomLoginSuccessHandler())  // <--- 在這裡註冊我們的 Handler
        );

    return http.build();
  }

  // ...
}
```

到此，已完成了....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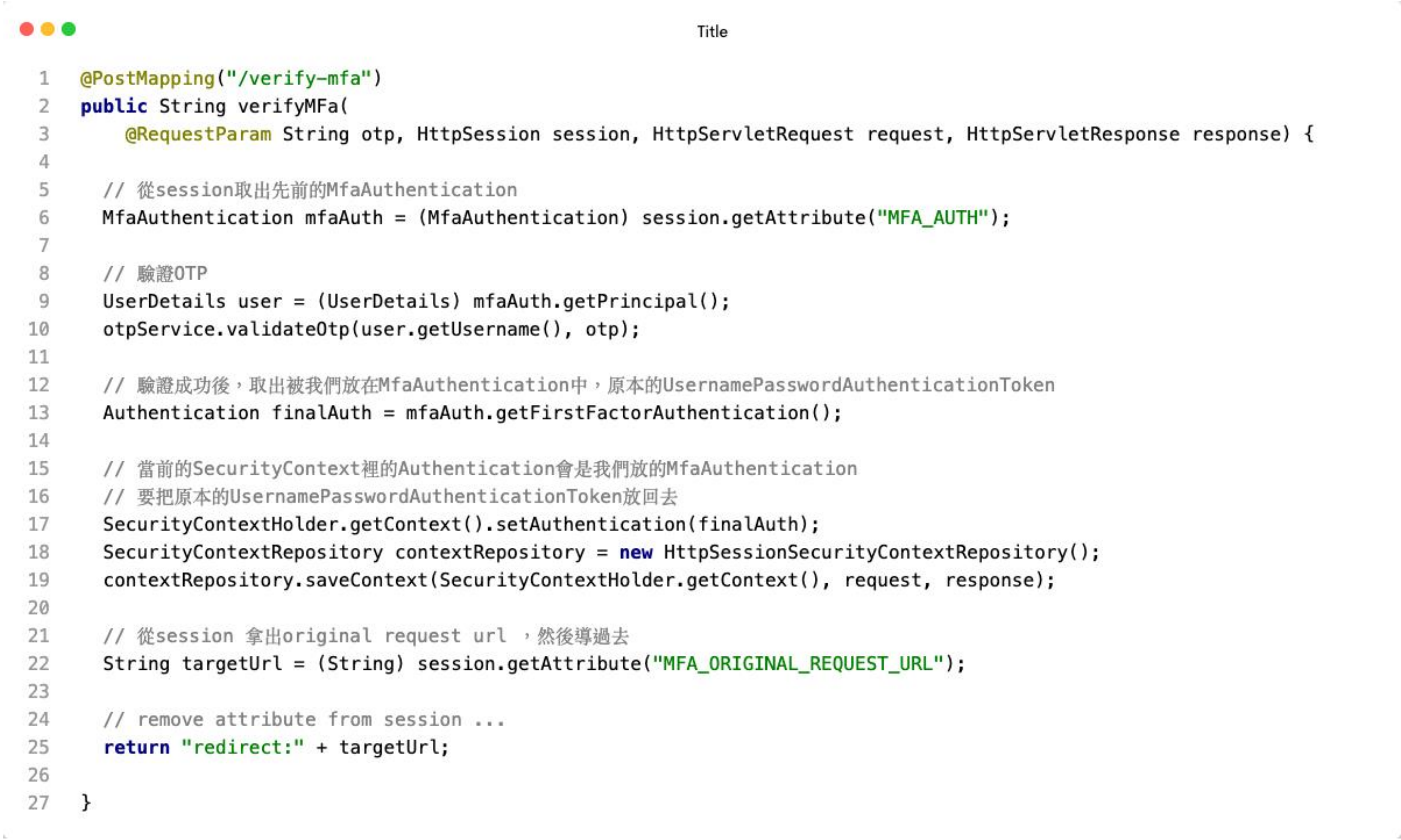
can authenticate ?
發送OTP
MfaAuthentication 帶著authenticated token
MfaAuthentication
onAuthenticationSuccess
302 Redirect to otp(mfa) page

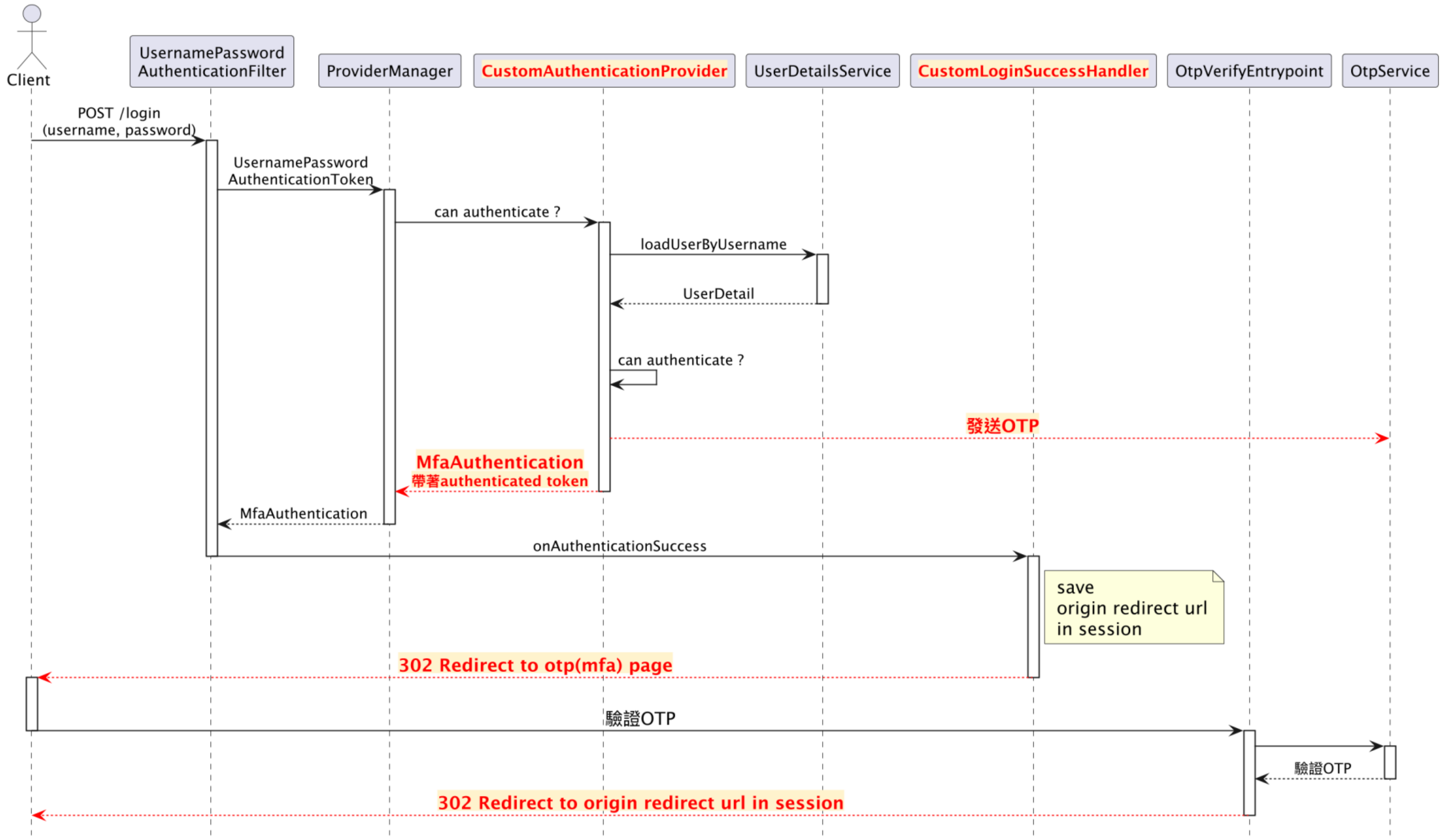
OtpVerifyEntrypoint



Title

```java
@PostMapping("/verify-mfa")
public String verifyMFa(
    @RequestParam String otp, HttpSession session, HttpServletRequest request, HttpServletResponse response) {

  // 從session取出先前的MfaAuthentication
  MfaAuthentication mfaAuth = (MfaAuthentication) session.getAttribute("MFA_AUTH");

  // 驗證OTP
  UserDetails user = (UserDetails) mfaAuth.getPrincipal();
  otpService.validateOtp(user.getUsername(), otp);

  // 驗證成功後，取出被我們放在MfaAuthentication中，原本的UsernamePasswordAuthenticationToken
  Authentication finalAuth = mfaAuth.getFirstFactorAuthentication();

  // 當前的SecurityContext裡的Authentication會是我們放的MfaAuthentication
  // 要把原本的UsernamePasswordAuthenticationToken放回去
  SecurityContextHolder.getContext().setAuthentication(finalAuth);
  SecurityContextRepository contextRepository = new HttpSessionSecurityContextRepository();
  contextRepository.saveContext(SecurityContextHolder.getContext(), request, response);

  // 從session 拿出original request url ，然後導過去
  String targetUrl = (String) session.getAttribute("MFA_ORIGINAL_REQUEST_URL");

  // remove attribute from session ...
  return "redirect:" + targetUrl;

}
```

調整後的 Form Login 流程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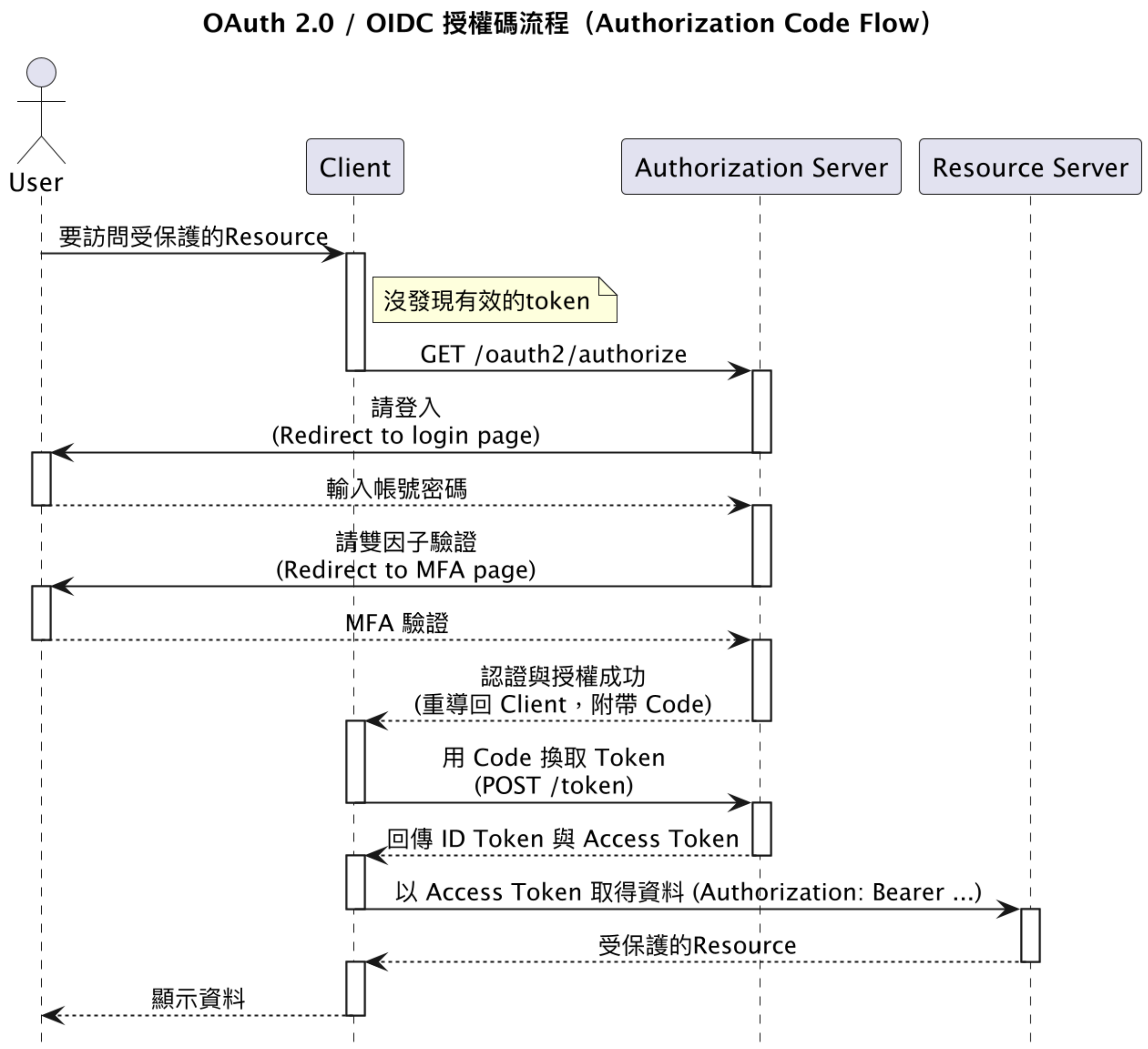
帶著authenticated token
MfaAuthentication
onAuthenticationSuccess
save origin redirect url in session
302 Redirect to otp(mfa) page
驗證OTP
驗證OTP
302 Redirect to origin redirect url in session

調整後的Authorization Code Flow



Thank You