IMPLEMENTING JWT AUTHENTICATION IN SpringBoot

17 January 2024 18:01

JWT :

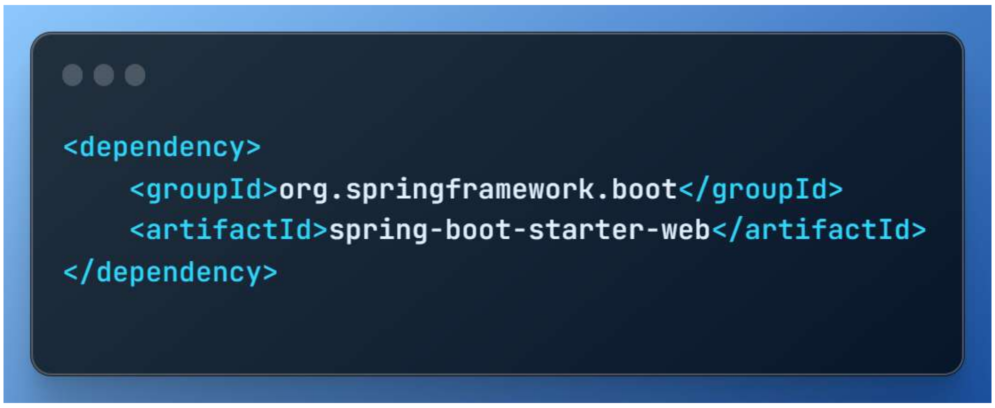
JSON Web Tokens (JWT) have become a popular method for securing modern web applications. JWTs allow you to transmit information securely between parties as a compact, self-contained, and digitally signed JSON object. In this blog post, we will walk you through the steps to implement JWT authentication in a Spring Boot application.

- We will see how to configure InMemory user and JWT authentication using latest spring boot 3.0.
- We will create one protected endpoint and try to secure endpoint using spring boot security.

Create new Spring Boot Project :

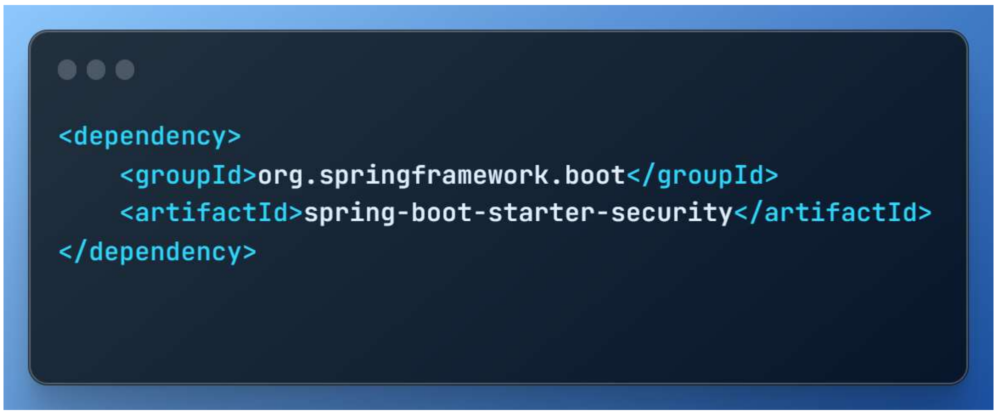
- Go to spring initializer and create new project with dependencies
- Add the following dependencies :

For Web :



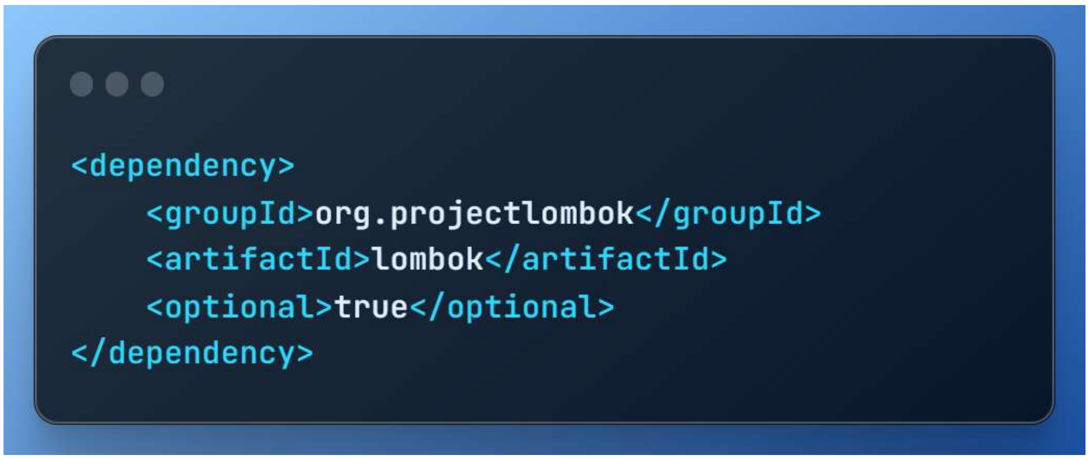
```xml
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-web</artifactId>
</dependency>
```

For security :



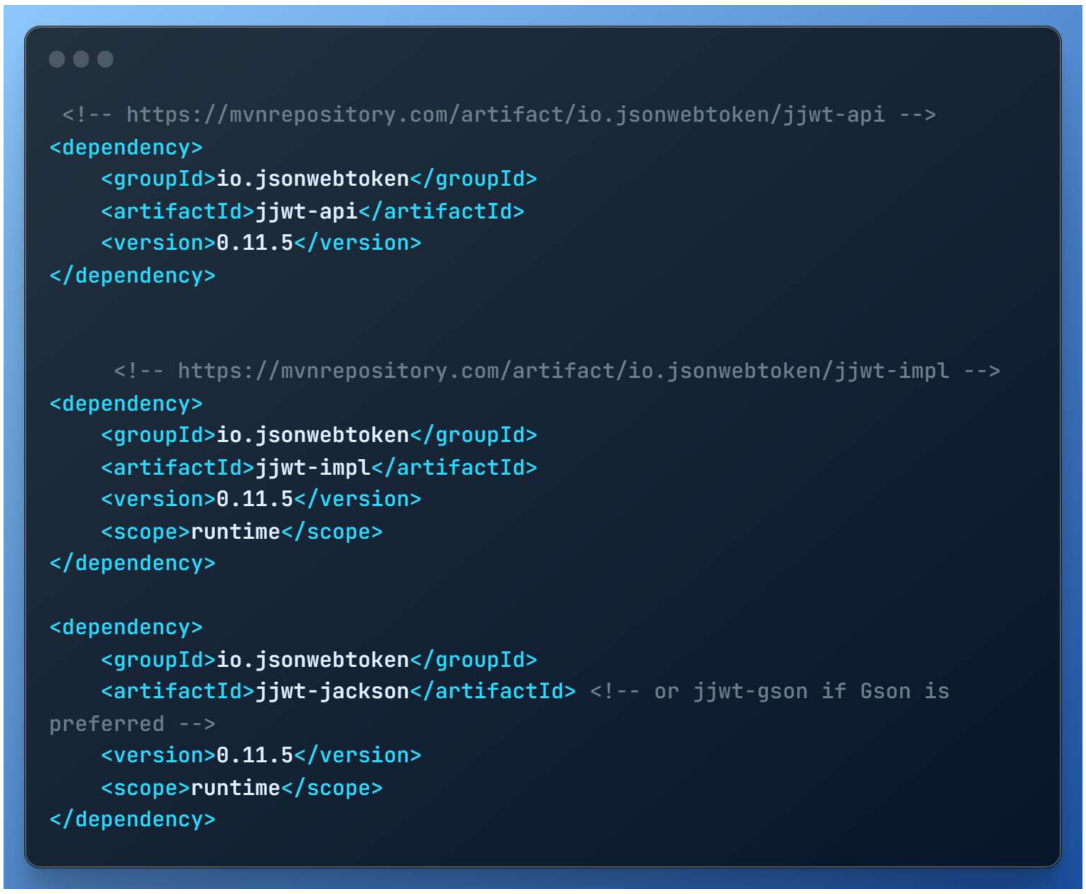
```xml
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-security</artifactId>
</dependency>
```

Lombok :



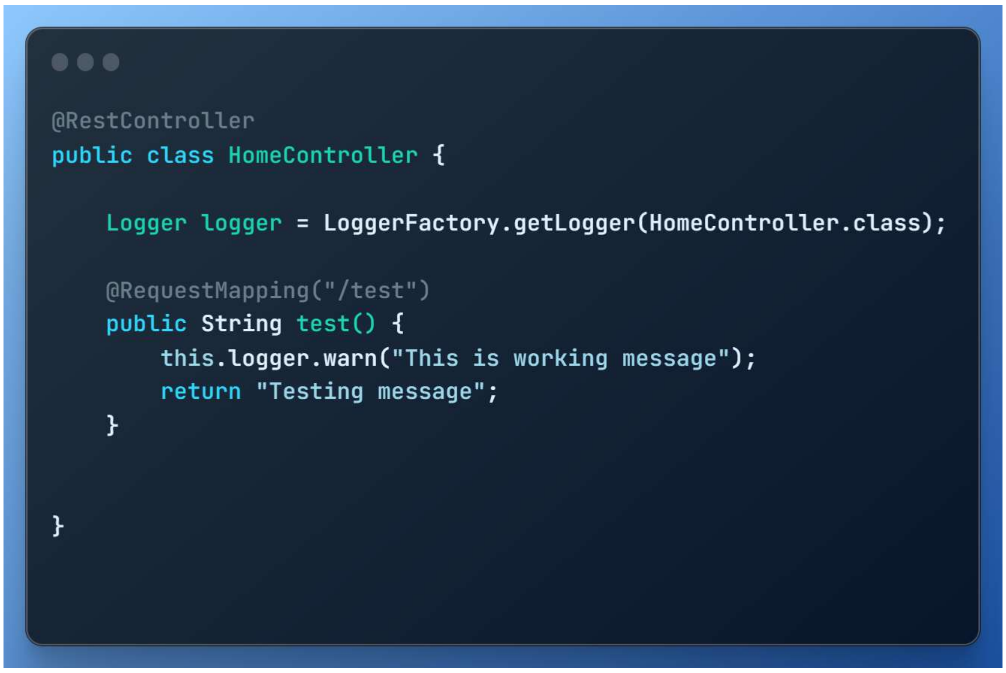
```xml
<dependency>
    <groupId>org.projectlombok</groupId>
    <artifactId>lombok</artifactId>
    <optional>true</optional>
</dependency>
```

For JWT :



```xml
 <!-- https://mvnrepository.com/artifact/io.jsonwebtoken/jjwt-api -->
<dependency>
    <groupId>io.jsonwebtoken</groupId>
    <artifactId>jjwt-api</artifactId>
    <version>0.11.5</version>
</dependency>


     <!-- https://mvnrepository.com/artifact/io.jsonwebtoken/jjwt-impl -->
<dependency>
    <groupId>io.jsonwebtoken</groupId>
    <artifactId>jjwt-impl</artifactId>
    <version>0.11.5</version>
    <scope>runtime</scope>
</dependency>

<dependency>
    <groupId>io.jsonwebtoken</groupId>
    <artifactId>jjwt-jackson</artifactId> <!-- or jjwt-gson if Gson is
preferred -->
    <version>0.11.5</version>
    <scope>runtime</scope>
</dependency>
```

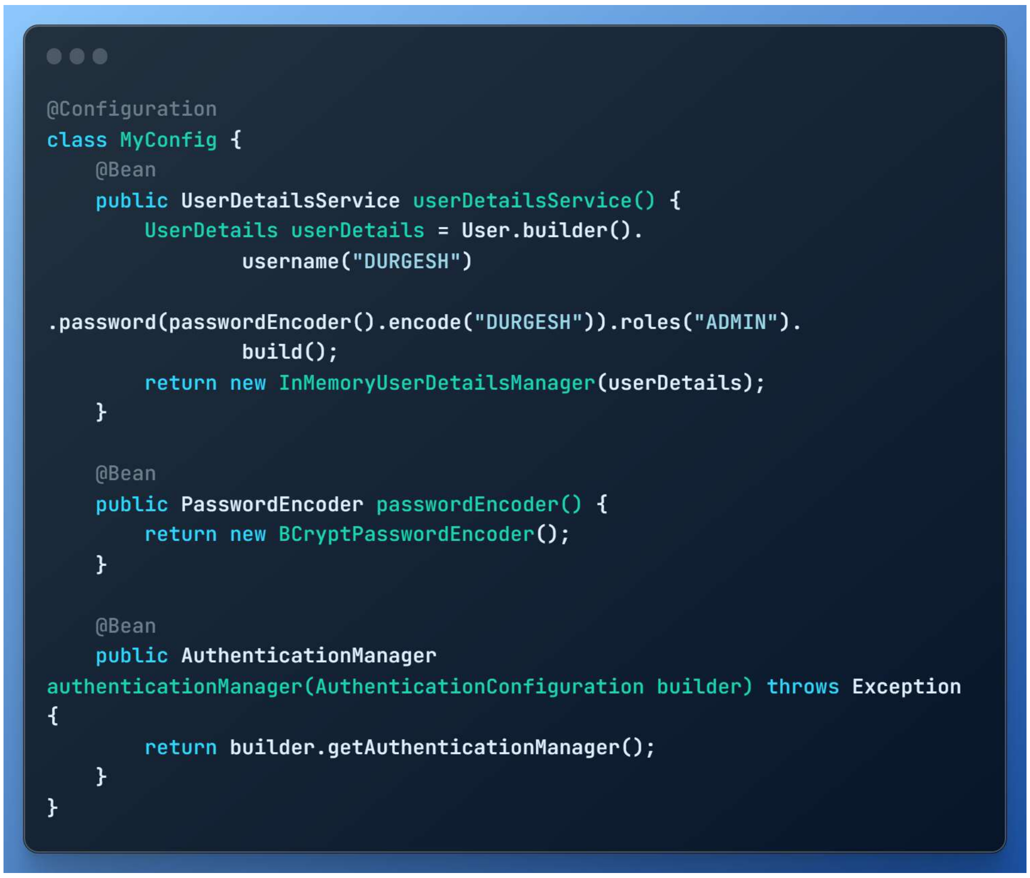
Create End Point to be secured :



```
@RestController
public class HomeController {

    Logger logger = LoggerFactory.getLogger(HomeController.class);

    @RequestMapping("/test")
    public String test() {
        this.logger.warn("This is working message");
        return "Testing message";
    }


}
```

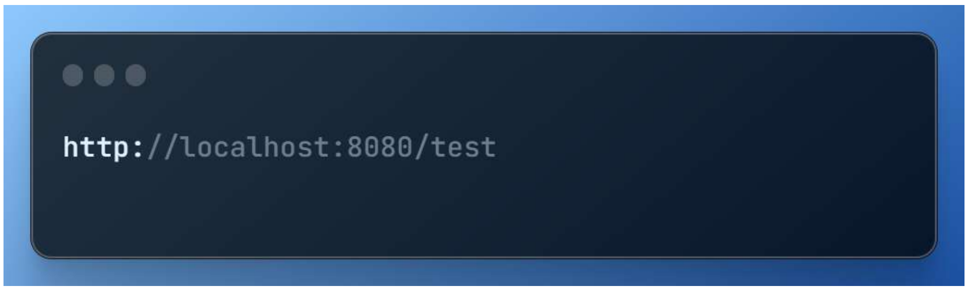
Create InMemory user with UserDetailService Bean :

- Create UserDetailService bean and write the InMemory user implementation
- Create CustomConfig class and create bean and also create two important bean PasswordEncoder and AuthenticationManager so that we can use later.



```
@Configuration
class MyConfig {
    @Bean
    public UserDetailsService userDetailsService() {
        UserDetails userDetails = User.builder().
                username("DURGESH")

.password(passwordEncoder().encode("DURGESH")).roles("ADMIN").
                build();
        return new InMemoryUserDetailsManager(userDetails);
    }

    @Bean
    public PasswordEncoder passwordEncoder() {
        return new BCryptPasswordEncoder();
    }

    @Bean
    public AuthenticationManager
authenticationManager(AuthenticationConfiguration builder) throws Exception
{
        return builder.getAuthenticationManager();
    }
}
```

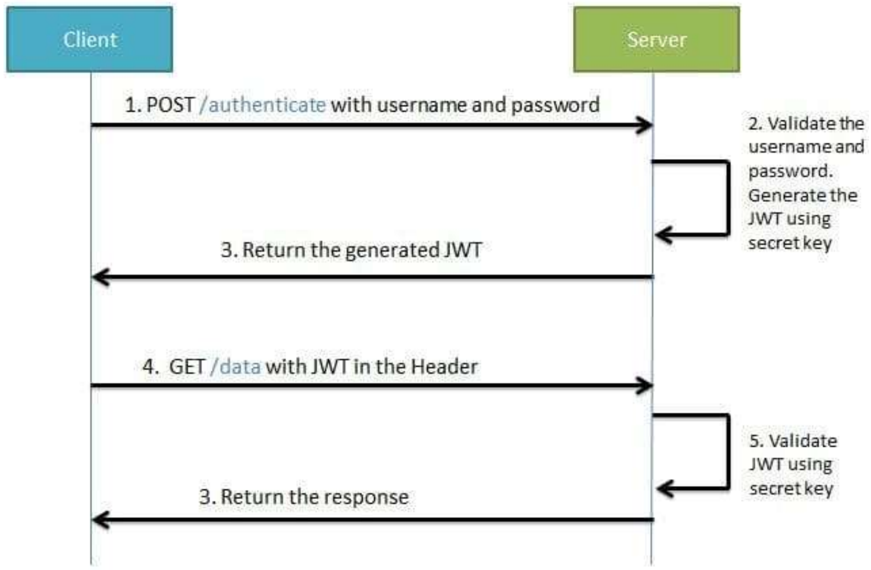
- Now we can login with given username and password by default spring security provide form login .
- open browser and open :



```
http://localhost:8080/test
```

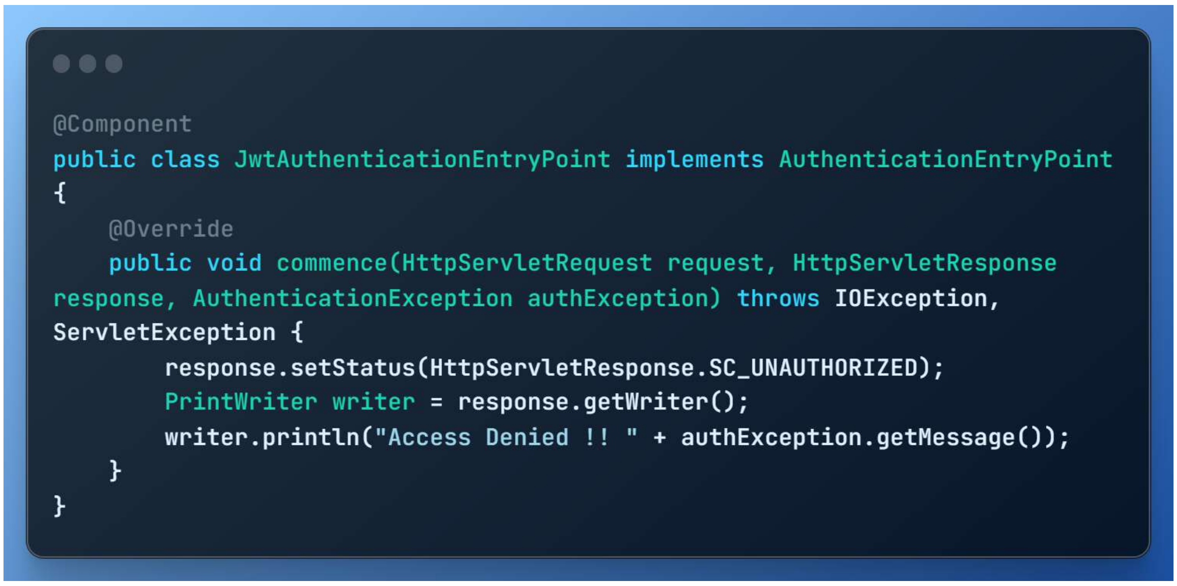
- when login form is prompted just login with username and password as given .

JWT Authentication Flow :


Client
Server
1. POST /authenticate with username and password
2. Validate the username and password. Generate the JWT using secret key
3. Return the generated JWT
4. GET /data with JWT in the Header
5. Validate JWT using secret key
3. Return the response

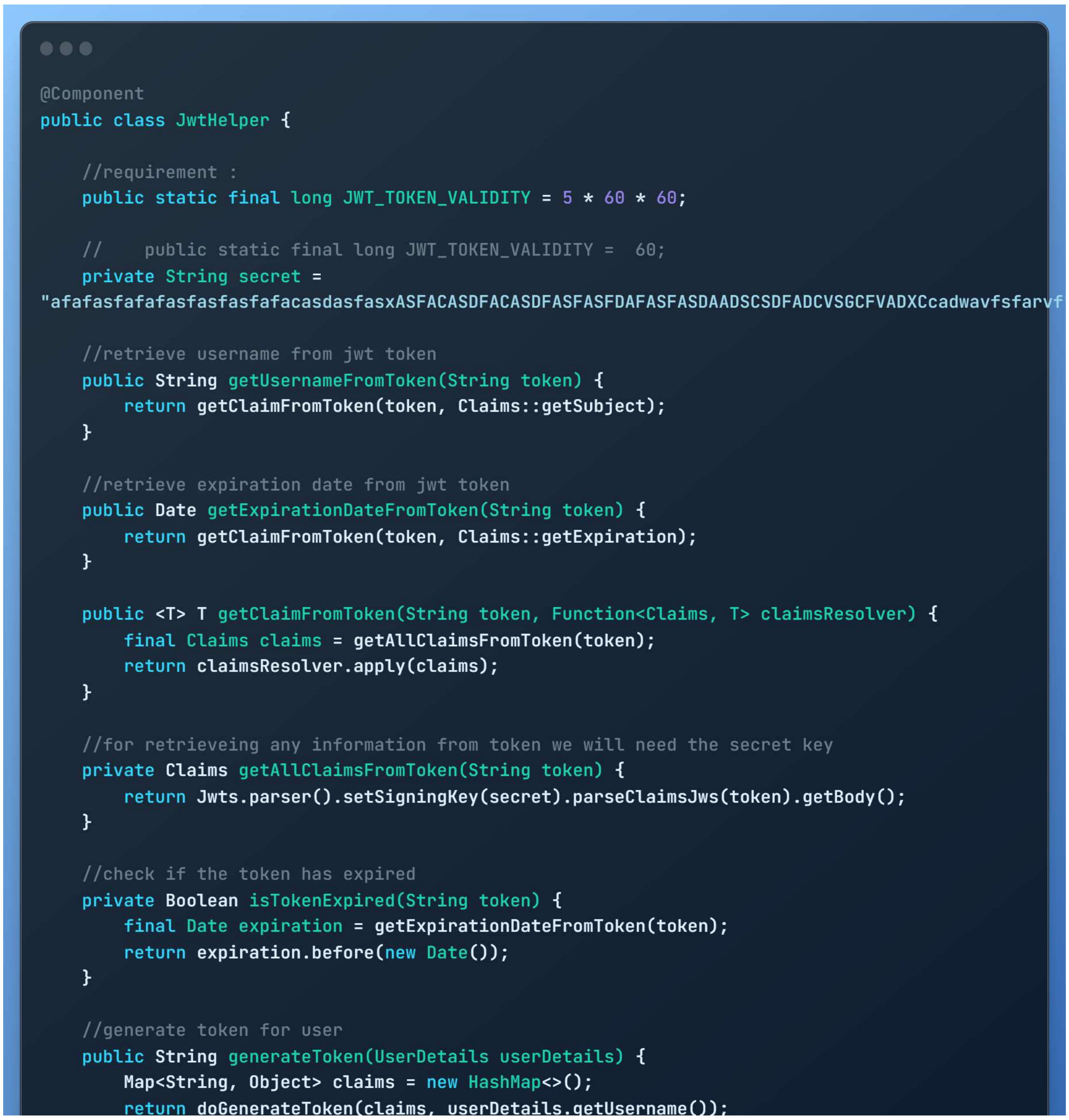
Steps to implement jwt token :

1) Make sure spring-boot-starter-security is there in pom.xml
2) Create Class JWTAthenticationEntryPoint that implement AuthenticationEntryPoint.
Method of this class is called whenever as exception is thrown due to unauthenticated user trying to access the resource that required authentication.

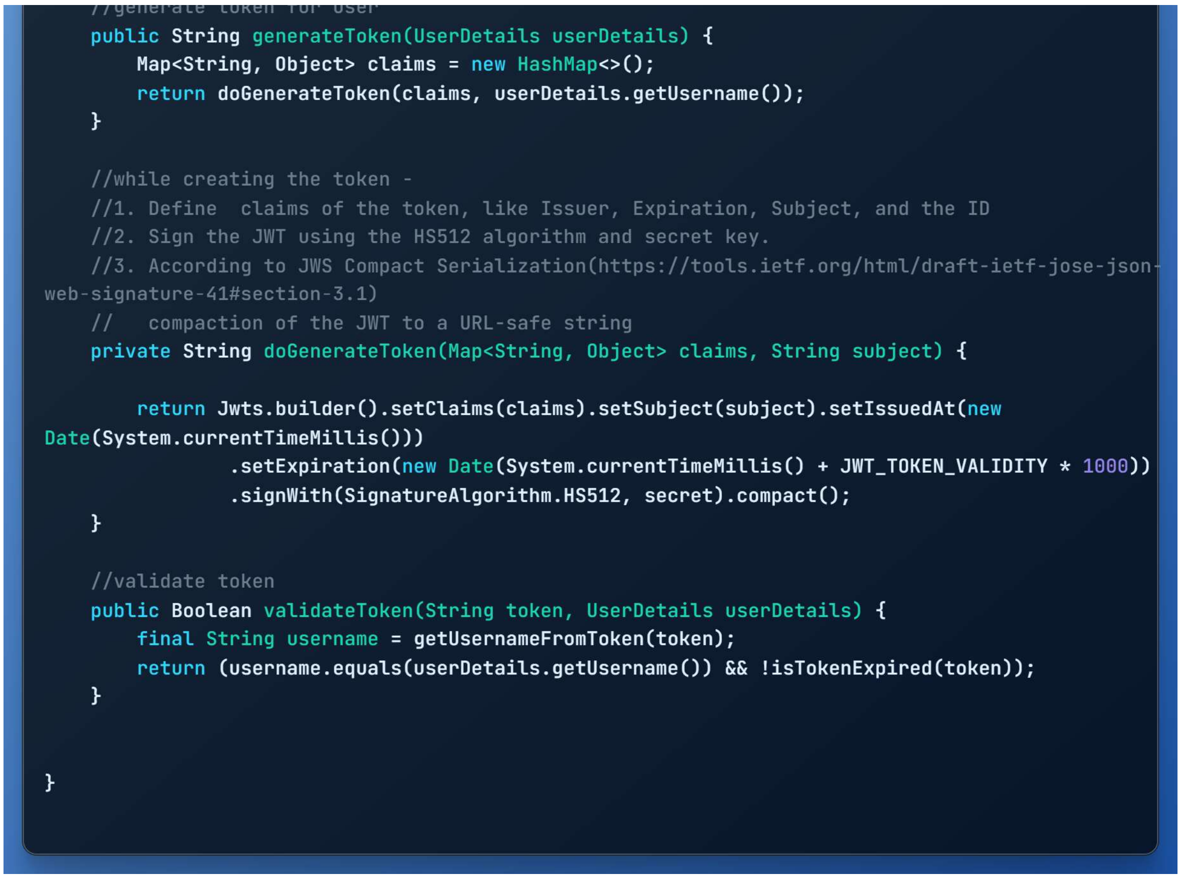


```java
@Component
public class JwtAuthenticationEntryPoint implements AuthenticationEntryPoint
{
    @Override
    public void commence(HttpServletRequest request, HttpServletResponse
response, AuthenticationException authException) throws IOException,
ServletException {
        response.setStatus(HttpServletResponse.SC_UNAUTHORIZED);
        PrintWriter writer = response.getWriter();
        writer.println("Access Denied !! " + authException.getMessage());
    }
}
```

3) Create JWTHelper class This class contains method related to perform operations with jwt token like generateToken, validateToken etc.



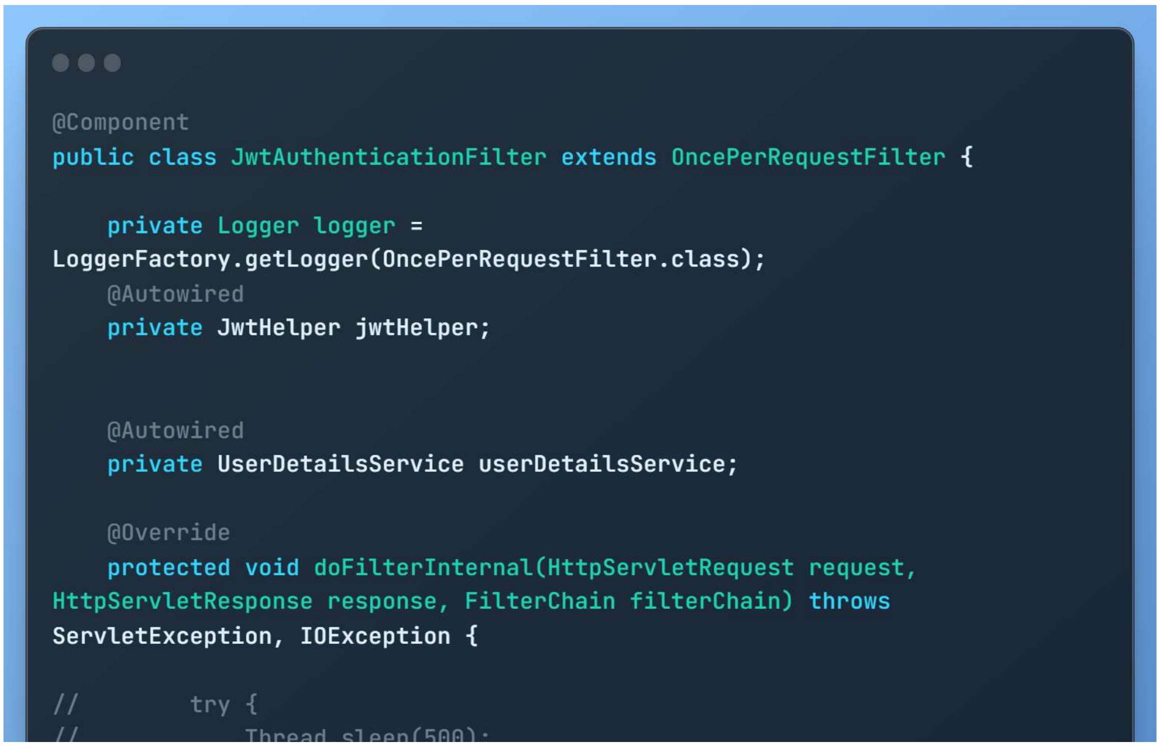
```java
@Component
public class JwtHelper {

    //requirement :
    public static final long JWT_TOKEN_VALIDITY = 5 * 60 * 60;

    //    public static final long JWT_TOKEN_VALIDITY =  60;
    private String secret =
"afafasfafafasfasfasfafacasdasfasxASFACASDFACASDFASFASFDAFASFASDAADSCSDFADCVSGCFVADXCcadwavfsfarvf

    //retrieve username from jwt token
    public String getUsernameFromToken(String token) {
        return getClaimFromToken(token, Claims::getSubject);
    }

    //retrieve expiration date from jwt token
    public Date getExpirationDateFromToken(String token) {
        return getClaimFromToken(token, Claims::getExpiration);
    }

    public <T> T getClaimFromToken(String token, Function<Claims, T> claimsResolver) {
        final Claims claims = getAllClaimsFromToken(token);
        return claimsResolver.apply(claims);
    }

    //for retrieveing any information from token we will need the secret key
    private Claims getAllClaimsFromToken(String token) {
        return Jwts.parser().setSigningKey(secret).parseClaimsJws(token).getBody();
    }

    //check if the token has expired
    private Boolean isTokenExpired(String token) {
        final Date expiration = getExpirationDateFromToken(token);
        return expiration.before(new Date());
    }

    //generate token for user
    public String generateToken(UserDetails userDetails) {
        Map<String, Object> claims = new HashMap<>();
        return doGenerateToken(claims, userDetails.getUsername());
```



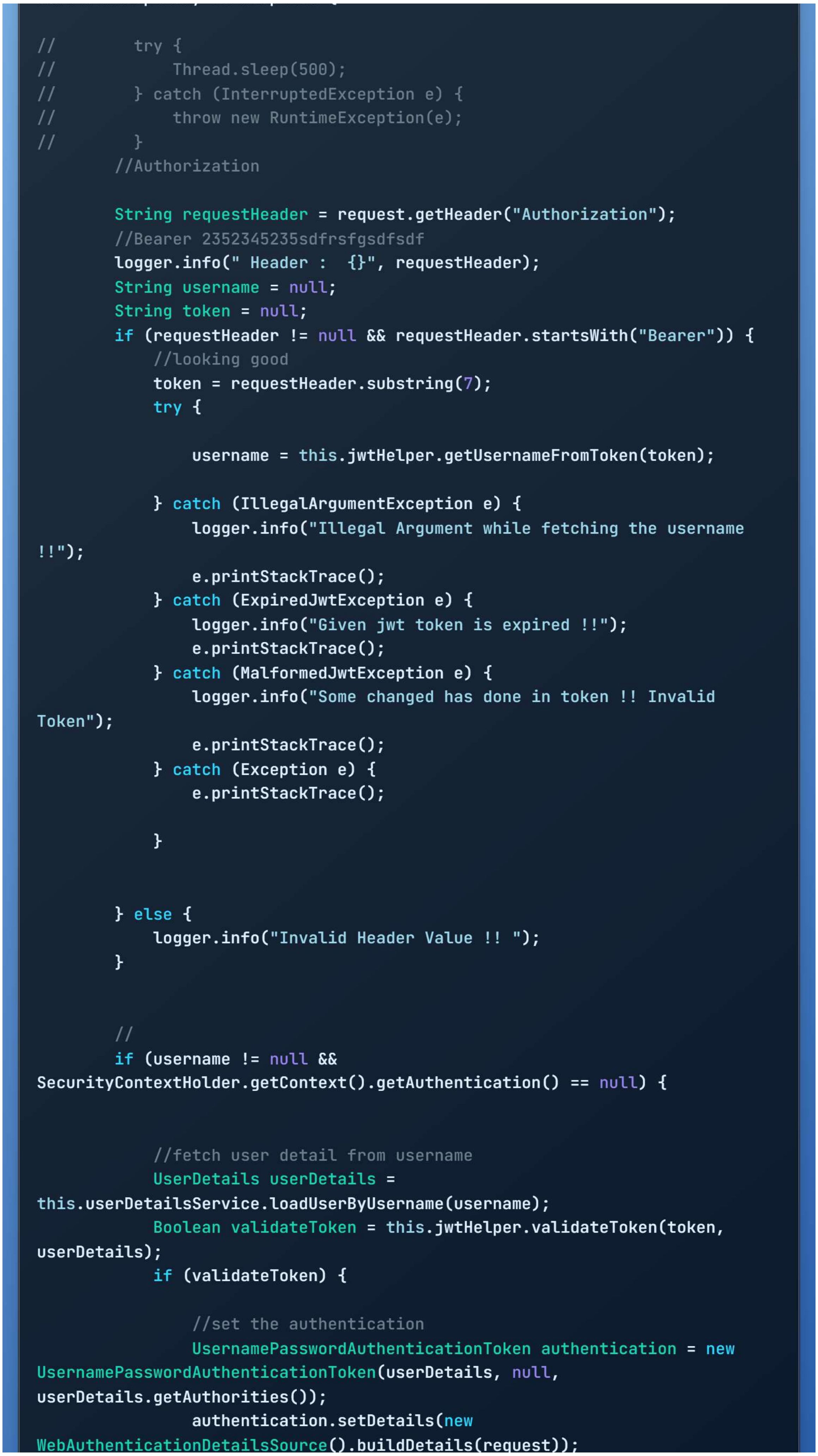
```
    //generate token for user
    public String generateToken(UserDetails userDetails) {
        Map<String, Object> claims = new HashMap<>();
        return doGenerateToken(claims, userDetails.getUsername());
    }

    //while creating the token -
    //1. Define  claims of the token, like Issuer, Expiration, Subject, and the ID
    //2. Sign the JWT using the HS512 algorithm and secret key.
    //3. According to JWS Compact Serialization(https://tools.ietf.org/html/draft-ietf-jose-json-
web-signature-41#section-3.1)
    //   compaction of the JWT to a URL-safe string
    private String doGenerateToken(Map<String, Object> claims, String subject) {

        return Jwts.builder().setClaims(claims).setSubject(subject).setIssuedAt(new
Date(System.currentTimeMillis()))
                .setExpiration(new Date(System.currentTimeMillis() + JWT_TOKEN_VALIDITY * 1000))
                .signWith(SignatureAlgorithm.HS512, secret).compact();
    }

    //validate token
    public Boolean validateToken(String token, UserDetails userDetails) {
        final String username = getUsernameFromToken(token);
        return (username.equals(userDetails.getUsername()) && !isTokenExpired(token));
    }


}
```

4) Create JWTAuthenticationFilter that extends OncePerRequestFilter and override method and write the logic to check the token that is comming in header. We have to write 5 important logic :

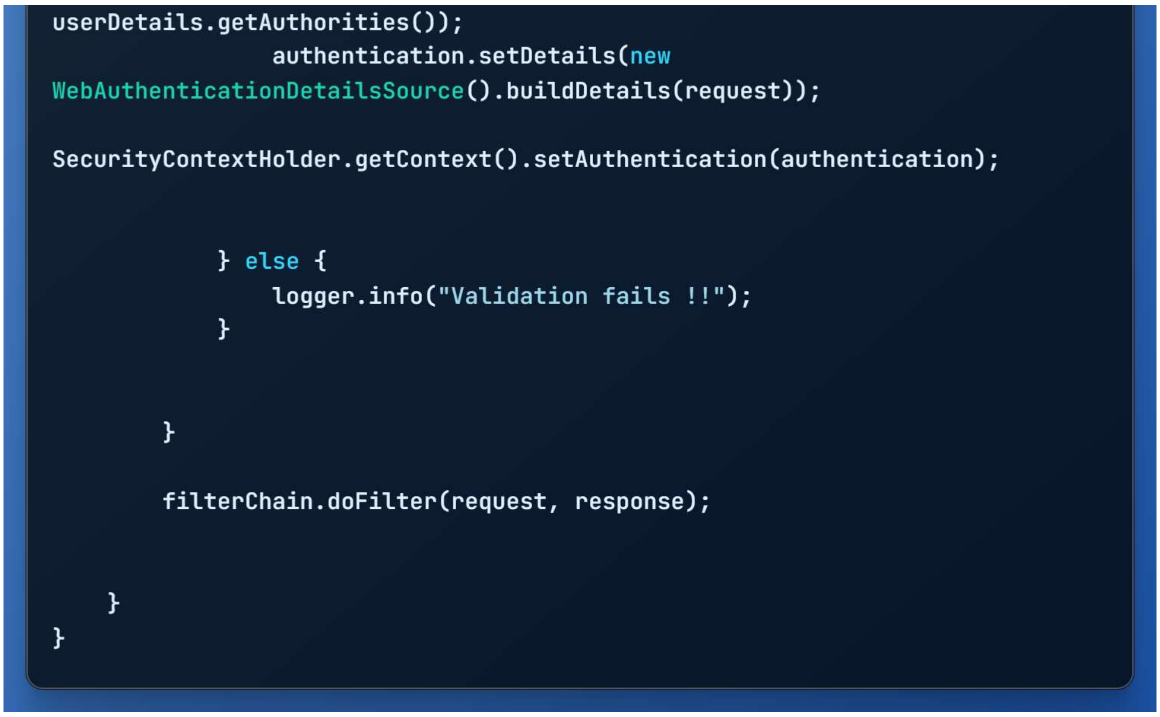
1. Get Token from request
2. Validate Token
3. GetUsername from token
4. Load user associated with this token
5. set authentication



```
@Component
public class JwtAuthenticationFilter extends OncePerRequestFilter {

    private Logger logger =
LoggerFactory.getLogger(OncePerRequestFilter.class);
    @Autowired
    private JwtHelper jwtHelper;


    @Autowired
    private UserDetailsService userDetailsService;

    @Override
    protected void doFilterInternal(HttpServletRequest request,
HttpServletResponse response, FilterChain filterChain) throws
ServletException, IOException {

//        try {
//            Thread.sleep(500);
```

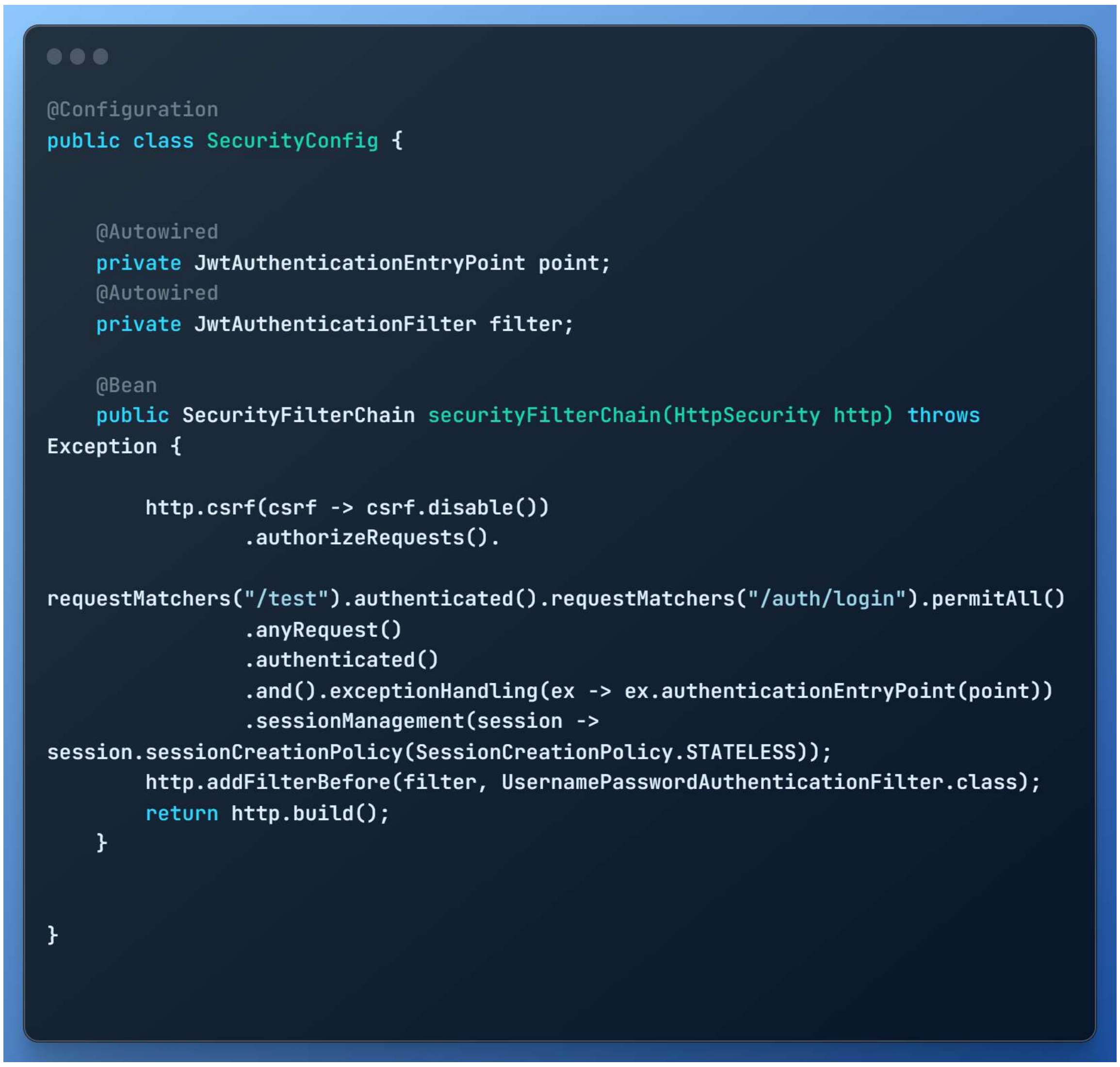


```
//        try {
//            Thread.sleep(500);
//        } catch (InterruptedException e) {
//            throw new RuntimeException(e);
//        }
        //Authorization

        String requestHeader = request.getHeader("Authorization");
        //Bearer 2352345235sdfrsfgsdfsdf
        logger.info(" Header :  {}", requestHeader);
        String username = null;
        String token = null;
        if (requestHeader != null && requestHeader.startsWith("Bearer")) {
            //looking good
            token = requestHeader.substring(7);
            try {

                username = this.jwtHelper.getUsernameFromToken(token);

            } catch (IllegalArgumentException e) {
                logger.info("Illegal Argument while fetching the username
!!");
                e.printStackTrace();
            } catch (ExpiredJwtException e) {
                logger.info("Given jwt token is expired !!");
                e.printStackTrace();
            } catch (MalformedJwtException e) {
                logger.info("Some changed has done in token !! Invalid
Token");
                e.printStackTrace();
            } catch (Exception e) {
                e.printStackTrace();

            }


        } else {
            logger.info("Invalid Header Value !! ");
        }


        //
        if (username != null &&
SecurityContextHolder.getContext().getAuthentication() == null) {


            //fetch user detail from username
            UserDetails userDetails =
this.userDetailsService.loadUserByUsername(username);
            Boolean validateToken = this.jwtHelper.validateToken(token,
userDetails);
            if (validateToken) {

                //set the authentication
                UsernamePasswordAuthenticationToken authentication = new
UsernamePasswordAuthenticationToken(userDetails, null,
userDetails.getAuthorities());
                authentication.setDetails(new
WebAuthenticationDetailsSource().buildDetails(request));
```



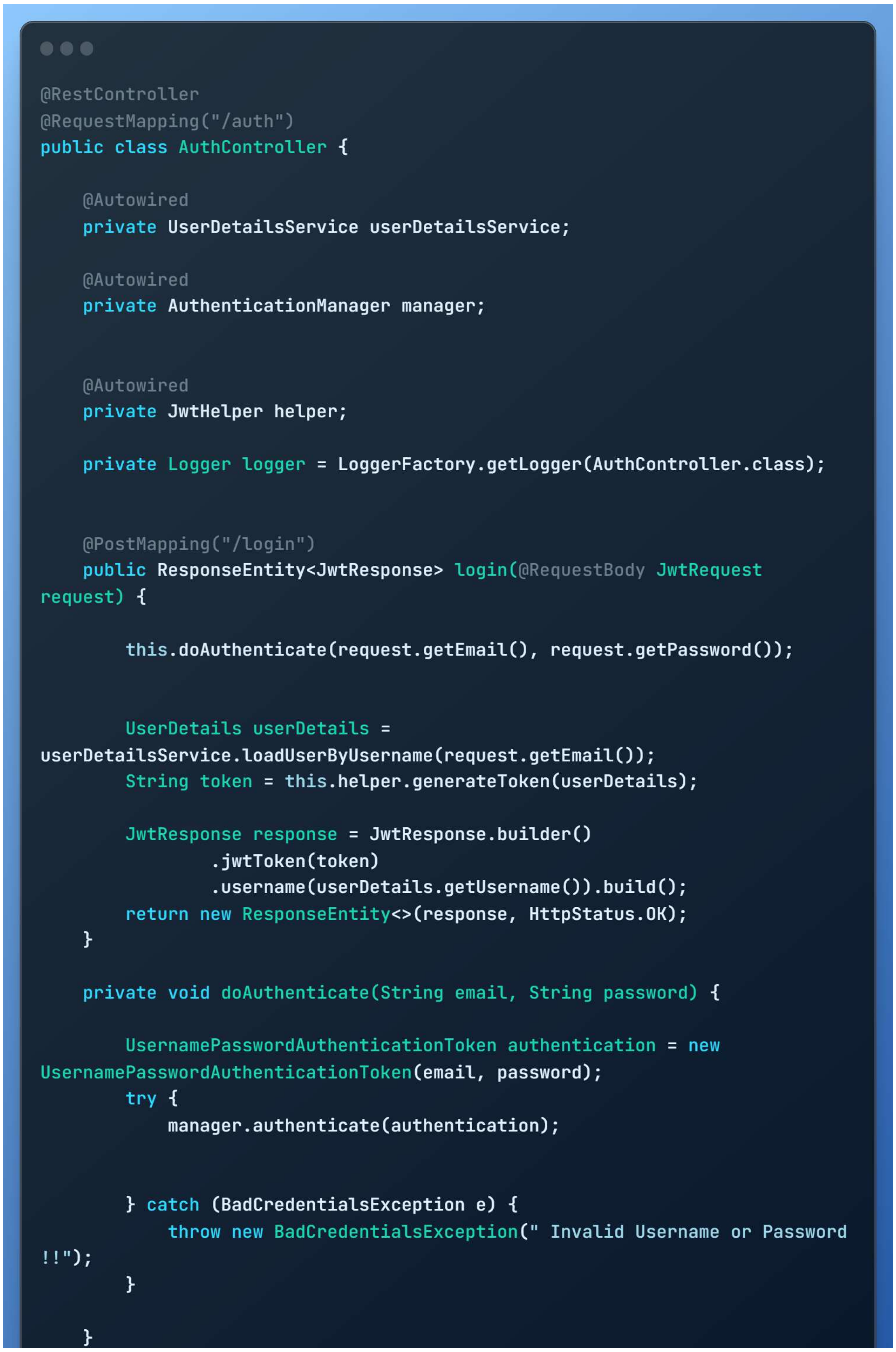
```java
userDetails.getAuthorities());
                authentication.setDetails(new
WebAuthenticationDetailsSource().buildDetails(request));

SecurityContextHolder.getContext().setAuthentication(authentication);


            } else {
                logger.info("Validation fails !!");
            }


        }

        filterChain.doFilter(request, response);


    }
}
```

5) Configure spring security in configuration file :

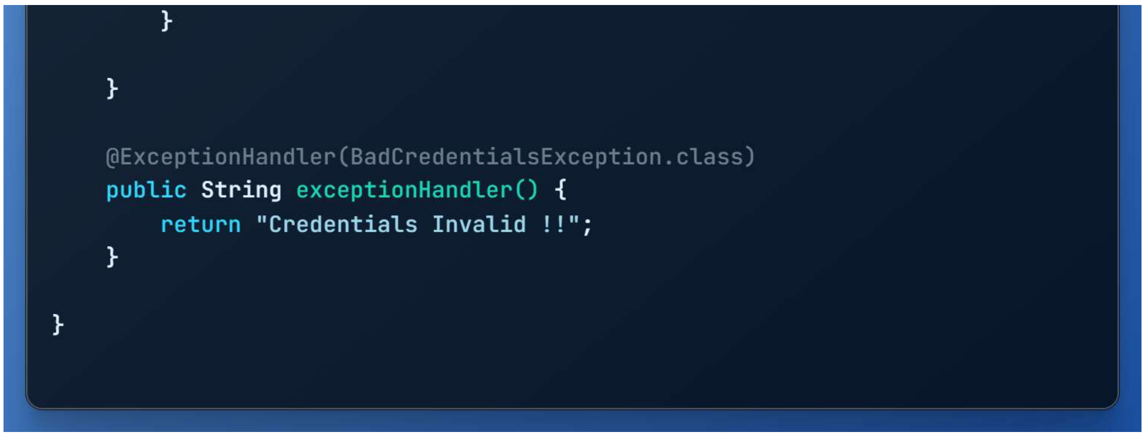


```java
@Configuration
public class SecurityConfig {


    @Autowired
    private JwtAuthenticationEntryPoint point;
    @Autowired
    private JwtAuthenticationFilter filter;

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

        http.csrf(csrf -> csrf.disable())
                .authorizeRequests().

requestMatchers("/test").authenticated().requestMatchers("/auth/login").permitAll()
                .anyRequest()
                .authenticated()
                .and().exceptionHandling(ex -> ex.authenticationEntryPoint(point))
                .sessionManagement(session ->
session.sessionCreationPolicy(SessionCreationPolicy.STATELESS));
        http.addFilterBefore(filter, UsernamePasswordAuthenticationFilter.class);
        return http.build();
    }


}
```

6) Create JWTRequest and JWTResponse to receive request data and send Login success response.
7) Create login api to accept username and password and return token if username and password is correct.



```
@RestController
@RequestMapping("/auth")
public class AuthController {

    @Autowired
    private UserDetailsService userDetailsService;

    @Autowired
    private AuthenticationManager manager;


    @Autowired
    private JwtHelper helper;

    private Logger logger = LoggerFactory.getLogger(AuthController.class);


    @PostMapping("/login")
    public ResponseEntity<JwtResponse> login(@RequestBody JwtRequest
request) {

        this.doAuthenticate(request.getEmail(), request.getPassword());


        UserDetails userDetails =
userDetailsService.loadUserByUsername(request.getEmail());
        String token = this.helper.generateToken(userDetails);

        JwtResponse response = JwtResponse.builder()
                .jwtToken(token)
                .username(userDetails.getUsername()).build();
        return new ResponseEntity<>(response, HttpStatus.OK);
    }

    private void doAuthenticate(String email, String password) {

        UsernamePasswordAuthenticationToken authentication = new
UsernamePasswordAuthenticationToken(email, password);
        try {
            manager.authenticate(authentication);


        } catch (BadCredentialsException e) {
            throw new BadCredentialsException(" Invalid Username or Password
!!");
        }

    }
```



```java
        }

    }

    @ExceptionHandler(BadCredentialsException.class)
    public String exceptionHandler() {
        return "Credentials Invalid !!";
    }

}
```

8) Test Application.