Full-Stack Software Development

Lab Sheet 11

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EC/2021/074

AuthController.java

```
package com.example.LibraryManagement.controller;

import com.example.LibraryManagement.model.User;

import com.example.LibraryManagement.payload.*;

import com.example.LibraryManagement.repository.UserRepository;

import com.example.LibraryManagement.security.JwtUtils;

import org.springframework.beans.factory.annotation.Autowired;

import org.springframework.http.ResponseEntity;

import org.springframework.security.authentication.*;

import org.springframework.security.core.Authentication;

import org.springframework.security.crypto.password.PasswordEncoder;

import org.springframework.web.bind.annotation.*;


@RestController

@RequestMapping("/api/auth")

public class AuthController {

   @Autowired AuthenticationManager authenticationManager;

   @Autowired UserRepository userRepository;

   @Autowired PasswordEncoder encoder;

   @Autowired JwtUtils jwtUtils;


   @PostMapping("/signin")

   public ResponseEntity<?> authenticateUser(@RequestBody LoginRequest loginRequest) {

      Authentication authentication = authenticationManager.authenticate(

            new UsernamePasswordAuthenticationToken(loginRequest.getUsername(),
loginRequest.getPassword()));
```

```
        String jwt = jwtUtils.generateJwtToken(authentication);
        return ResponseEntity.ok(new JwtResponse(jwt));
    }

    @PostMapping("/signup")
    public ResponseEntity<?> registerUser(@RequestBody SignupRequest signUpRequest) {
        User user = new User(signUpRequest.getUsername(),
encoder.encode(signUpRequest.getPassword()));
        user.setRoles(signUpRequest.getRoles());
        userRepository.save(user);
        return ResponseEntity.ok("User registered successfully!");
    }
}
```

BookController.java

```
package com.example.LibraryManagement.controller;

import com.example.LibraryManagement.model.Book;
import com.example.LibraryManagement.repository.BookRepository;
import org.springframework.http.ResponseEntity;
import org.springframework.security.access.prepost.PreAuthorize;
import org.springframework.web.bind.annotation.*;

import java.util.List;

@CrossOrigin(origins = "*", maxAge = 3600) // Handles CORS issues for your React frontend
@RestController
```

```
@RequestMapping("/api/books")
public class BookController {

    private final BookRepository bookRepository;

    public BookController(BookRepository bookRepository) {
        this.bookRepository = bookRepository;
    }

    @GetMapping
    @PreAuthorize("hasRole('ADMIN') or hasRole('USER')")
    public List<Book> getAll() {
        return bookRepository.findAll();
    }

    @GetMapping("/{id}")
    @PreAuthorize("hasRole('ADMIN') or hasRole('USER')")
    public ResponseEntity<Book> getById(@PathVariable String id) {
        return bookRepository.findById(id)
                .map(ResponseEntity::ok)
                .orElse(ResponseEntity.notFound().build());
    }

    @PostMapping
    @PreAuthorize("hasRole('ADMIN')")
    public Book add(@RequestBody Book book) {
```

```
    return bookRepository.save(book);
  }

  @PutMapping("/{id}")
  @PreAuthorize("hasRole('ADMIN')")
  public ResponseEntity<Book> update(@PathVariable String id, @RequestBody Book book) {
    return bookRepository.findById(id)
        .map(existingBook -> {
          existingBook.setTitle(book.getTitle());
          existingBook.setAuthor(book.getAuthor());
          existingBook.setPublicationYear(book.getPublicationYear());
          existingBook.setGenre(book.getGenre());
          existingBook.setCopiesAvailable(book.getCopiesAvailable());
          return ResponseEntity.ok(bookRepository.save(existingBook));
        })
        .orElse(ResponseEntity.notFound().build());
  }

  @DeleteMapping("/{id}")
  @PreAuthorize("hasRole('ADMIN')")
  public ResponseEntity<?> delete(@PathVariable String id) {
    if (!bookRepository.existsById(id)) {
      return ResponseEntity.notFound().build();
    }
    bookRepository.deleteById(id);
    return ResponseEntity.ok("Book deleted successfully");
```

```
    }
}
```

Book.java

```
package com.example.LibraryManagement.model;


import org.springframework.data.annotation.Id;
import org.springframework.data.mongodb.core.mapping.Document;
import lombok.Data;
import lombok.NoArgsConstructor;
import lombok.AllArgsConstructor;


@Document(collection = "books")
@Data
@NoArgsConstructor
@AllArgsConstructor
public class Book {
    @Id
    private String id;
    private String title;
    private String author;
    private int publicationYear;
    private String genre;
    private int copiesAvailable; // add this field
}
```

Role.java

```
package com.example.LibraryManagement.model;

public enum Role {
   ROLE_USER,
   ROLE_ADMIN
}
```

User.java

```
package com.example.LibraryManagement.model;


import org.springframework.data.annotation.Id;
import org.springframework.data.mongodb.core.mapping.Document;
import java.util.Set;


@Document(collection = "users")
public class User {
   @Id
   private String id;
   private String username;
   private String password;
   private Set<String> roles; // ROLE_USER, ROLE_ADMIN


   public User() {}
   public User(String username, String password) {
      this.username = username;
      this.password = password;
   }
```

```
    // Getters and Setters
    public String getId() { return id; }
    public String getUsername() { return username; }
    public void setUsername(String username) { this.username = username; }
    public String getPassword() { return password; }
    public void setPassword(String password) { this.password = password; }
    public Set<String> getRoles() { return roles; }
    public void setRoles(Set<String> roles) { this.roles = roles; }
}
```

JwtResponse.java

```
package com.example.LibraryManagement.payload;


public class JwtResponse {


    private String token;
    private String type;


    public JwtResponse(String token) {
        this.token = token;
        this.type = "Bearer";
    }


    public String getToken() {
        return token;
    }
```

```
    public String getType() {
        return type;
    }

    public void setToken(String token) {
        this.token = token;
    }

    public void setType(String type) {
        this.type = type;
    }
}
```

LoginRequest.java

```
package com.example.LibraryManagement.payload;

public class LoginRequest {
    private String username;
    private String password;
    // Getters and Setters
    public String getUsername() { return username; }
    public String getPassword() { return password; }
}
```

signupRequest.java

```
package com.example.LibraryManagement.payload;
import java.util.Set;
```

```
public class SignupRequest {
    private String username;
    private String password;
    private Set<String> roles;
    // Getters and Setters
    public String getUsername() { return username; }
    public String getPassword() { return password; }
    public Set<String> getRoles() { return roles; }
}
```

BookRepository.java

```
package com.example.LibraryManagement.repository;
import com.example.LibraryManagement.model.Book;
import org.springframework.data.mongodb.repository.MongoRepository;
import org.springframework.stereotype.Repository;

import java.util.List;

@Repository
public interface BookRepository extends MongoRepository<Book, String> {
    List<Book> findByPublicationYear(int publicationYear);
}
```

UserRepository.java

```
package com.example.LibraryManagement.repository;
import com.example.LibraryManagement.model.User;
import org.springframework.data.mongodb.repository.MongoRepository;
```

```
import java.util.Optional;


public interface UserRepository extends MongoRepository<User, String> {
    Optional<User> findByUsername(String username);
}
```

JwtAuthFilter.java

```
package com.example.LibraryManagement.security;


import jakarta.servlet.FilterChain;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.security.authentication.UsernamePasswordAuthenticationToken;
import org.springframework.security.core.context.SecurityContextHolder;
import org.springframework.security.core.userdetails.UserDetails;
import org.springframework.security.web.authentication.WebAuthenticationDetailsSource;
import org.springframework.stereotype.Component;
import org.springframework.web.filter.OncePerRequestFilter;


import java.io.IOException;


@Component
public class JwtAuthFilter extends OncePerRequestFilter {
    @Autowired
    private JwtUtils jwtUtils;
```

```
    @Autowired
    private UserDetailsServiceImpl userDetailsService;

    @Override
    protected void doFilterInternal(HttpServletRequest request, HttpServletResponse response,
FilterChain filterChain)
            throws ServletException, IOException {
        try {
            String jwt = parseJwt(request);
            if (jwt != null && jwtUtils.validateJwtToken(jwt)) {
                String username = jwtUtils.getUserNameFromJwtToken(jwt);

                UserDetails userDetails = userDetailsService.loadUserByUsername(username);
                UsernamePasswordAuthenticationToken authentication = new
UsernamePasswordAuthenticationToken(
                        userDetails, null, userDetails.getAuthorities());

                authentication.setDetails(new
WebAuthenticationDetailsSource().buildDetails(request));

                SecurityContextHolder.getContext().setAuthentication(authentication);
            }
        } catch (Exception e) {
            logger.error("Cannot set user authentication: {}", e);
        }
```

```
        filterChain.doFilter(request, response);
    }

    private String parseJwt(HttpServletRequest request) {
        String headerAuth = request.getHeader("Authorization");
        if (headerAuth != null && headerAuth.startsWith("Bearer ")) {
            return headerAuth.substring(7);
        }
        return null;
    }
}
```

JwtUtils.java

```
// Java
package com.example.LibraryManagement.security;

import io.jsonwebtoken.*;
import io.jsonwebtoken.security.Keys;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.beans.factory.annotation.Value;
import org.springframework.security.core.Authentication;
import org.springframework.stereotype.Component;

import java.nio.charset.StandardCharsets;
import java.security.Key;
import java.util.Date;
```

```
@Component
public class JwtUtils {
   private static final Logger logger = LoggerFactory.getLogger(JwtUtils.class);

   @Value("${library.app.jwtSecret:DefaultSecretKeyChangeMeDefaultSecretKey}")
   private String jwtSecret;

   @Value("${library.app.jwtExpirationMs:86400000}") // default 1 day
   private int jwtExpirationMs;

   public String generateJwtToken(Authentication authentication) {
      String username = authentication.getName();
      Date now = new Date();
      Date expiryDate = new Date(now.getTime() + jwtExpirationMs);

      return Jwts.builder()
            .setSubject(username)
            .setIssuedAt(now)
            .setExpiration(expiryDate)
            .signWith(getSigningKey(), SignatureAlgorithm.HS256)
            .compact();
   }

   public String getUserNameFromJwtToken(String token) {
      Claims claims = Jwts.parserBuilder()
```

```
            .setSigningKey(getSigningKey())
            .build()
            .parseClaimsJws(token)
            .getBody();
    return claims.getSubject();
}

public boolean validateJwtToken(String authToken) {
    try {
        Jwts.parserBuilder()
                .setSigningKey(getSigningKey())
                .build()
                .parseClaimsJws(authToken);
        return true;
    } catch (SecurityException | MalformedJwtException | UnsupportedJwtException e) {
        logger.error("Invalid JWT token: {}", e.getMessage());
    } catch (ExpiredJwtException e) {
        logger.warn("JWT token is expired: {}", e.getMessage());
    } catch (IllegalArgumentException e) {
        logger.error("JWT claims string is empty: {}", e.getMessage());
    } catch (JwtException e) {
        logger.error("JWT exception: {}", e.getMessage());
    }
    return false;
}
```

```
    private Key getSigningKey() {
        byte[] keyBytes = jwtSecret.getBytes(StandardCharsets.UTF_8);
        return Keys.hmacShaKeyFor(keyBytes);
    }
}
```

securityConfig.java

```
// Java
package com.example.LibraryManagement.security;


import org.springframework.context.annotation.*;
import org.springframework.security.authentication.*;
import org.springframework.security.config.annotation.authentication.configuration.AuthenticationConfiguration;
import org.springframework.security.config.annotation.method.configuration.EnableMethodSecurity;
import org.springframework.security.config.annotation.web.builders.HttpSecurity;
import org.springframework.security.crypto.bcrypt.*;
import org.springframework.security.crypto.password.PasswordEncoder;
import org.springframework.security.web.SecurityFilterChain;
import org.springframework.security.web.authentication.UsernamePasswordAuthenticationFilter;


@Configuration
@EnableMethodSecurity
public class SecurityConfig {
```

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

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

    @Bean
    public JwtAuthFilter jwtAuthFilter() {
        return new JwtAuthFilter();
    }

    @Bean
    public SecurityFilterChain filterChain(HttpSecurity http,
                                           JwtAuthFilter jwtFilter) throws Exception {

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

        http.authorizeHttpRequests(authorize -> authorize
                .requestMatchers("/api/auth/**").permitAll()
                .anyRequest().authenticated()
        );
```

```
        http.addFilterBefore(jwtFilter,
                UsernamePasswordAuthenticationFilter.class);
        return http.build();
    }
}
```

UserDetailsServiceImpl.java

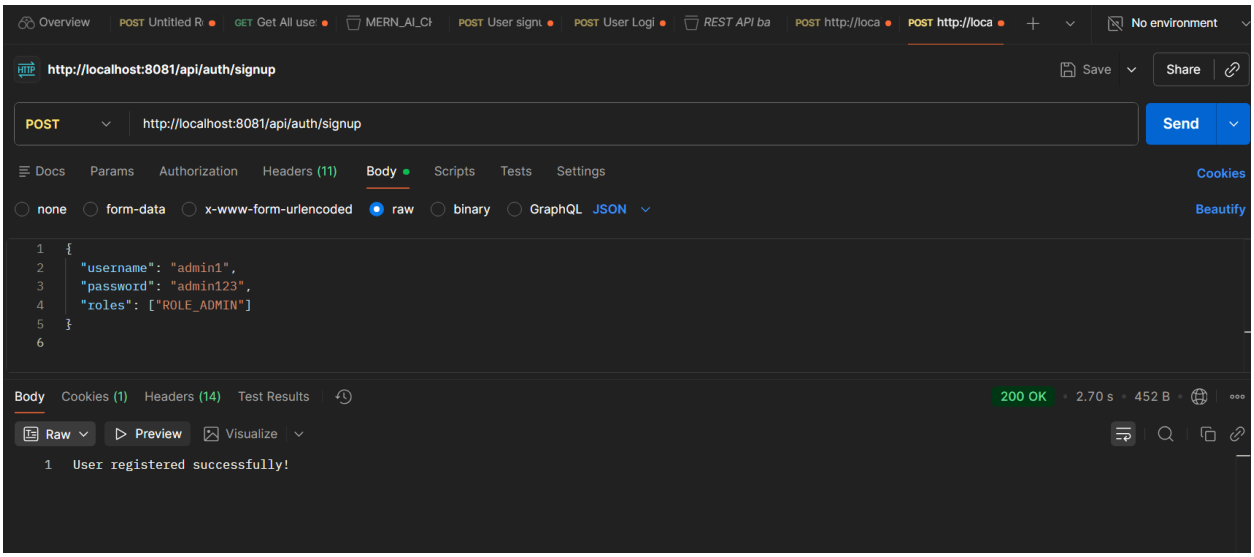
```
package com.example.LibraryManagement.security;
import com.example.LibraryManagement.model.User;
import com.example.LibraryManagement.repository.UserRepository;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.security.core.authority.SimpleGrantedAuthority;
import org.springframework.security.core.userdetails.*;
import org.springframework.stereotype.Service;
import java.util.stream.Collectors;

@Service
public class UserDetailsServiceImpl implements UserDetailsService {
    @Autowired
    UserRepository userRepository;

    @Override
    public UserDetails loadUserByUsername(String username) throws
UsernameNotFoundException {
        User user = userRepository.findByUsername(username)
                .orElseThrow(() -> new UsernameNotFoundException("User Not Found: " +
username));
```

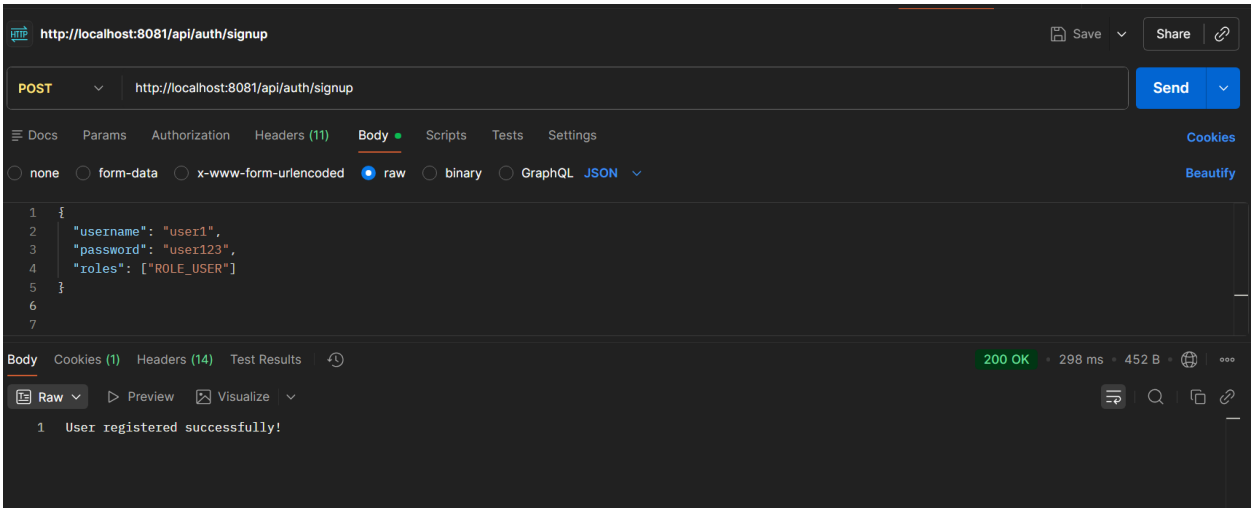
```
        return new org.springframework.security.core.userdetails.User(
                user.getUsername(),
                user.getPassword(),
                user.getRoles().stream().map(SimpleGrantedAuthority::new).collect(Collectors.toList())
        );
    }
}
```

Application.properties

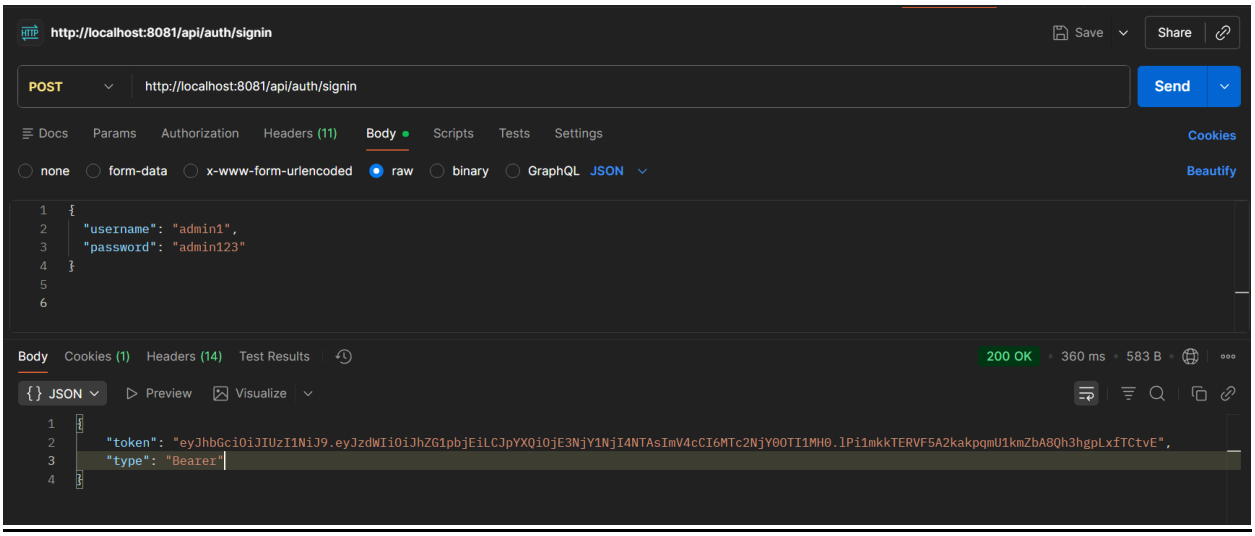
```
spring.application.name=LibraryManagement
server.port=8081

spring.data.mongodb.uri=mongodb+srv://ridmichamoda_db_user:RmZ8pwmu3KKQALeC@cluster0.tfyzhgg.mongodb.net/LibraryManagement?retryWrites=true&w=majority&tls=true

spring.jpa.show-sql=true
spring.jpa.hibernate.ddl-auto=update
spring.jpa.properties.hibernate.format_sql=true

logging.level.org.springframework=INFO
logging.level.com.mongodb=INFO
logging.level.org.mongodb.driver=INFO

server.error.include-message=always
```

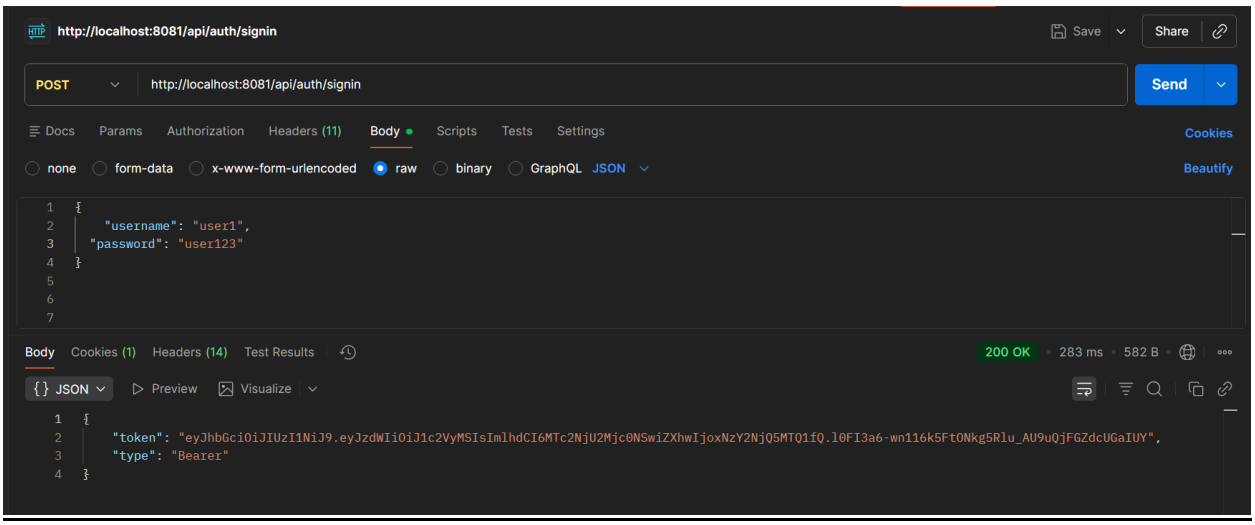
Register Users



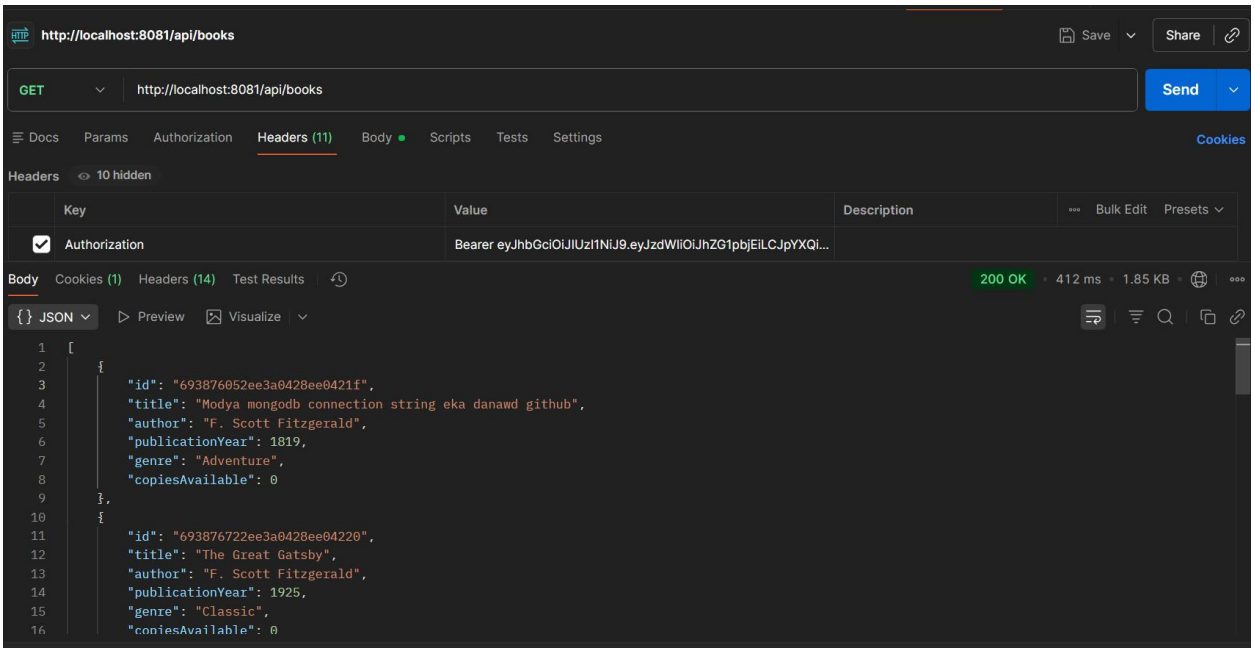


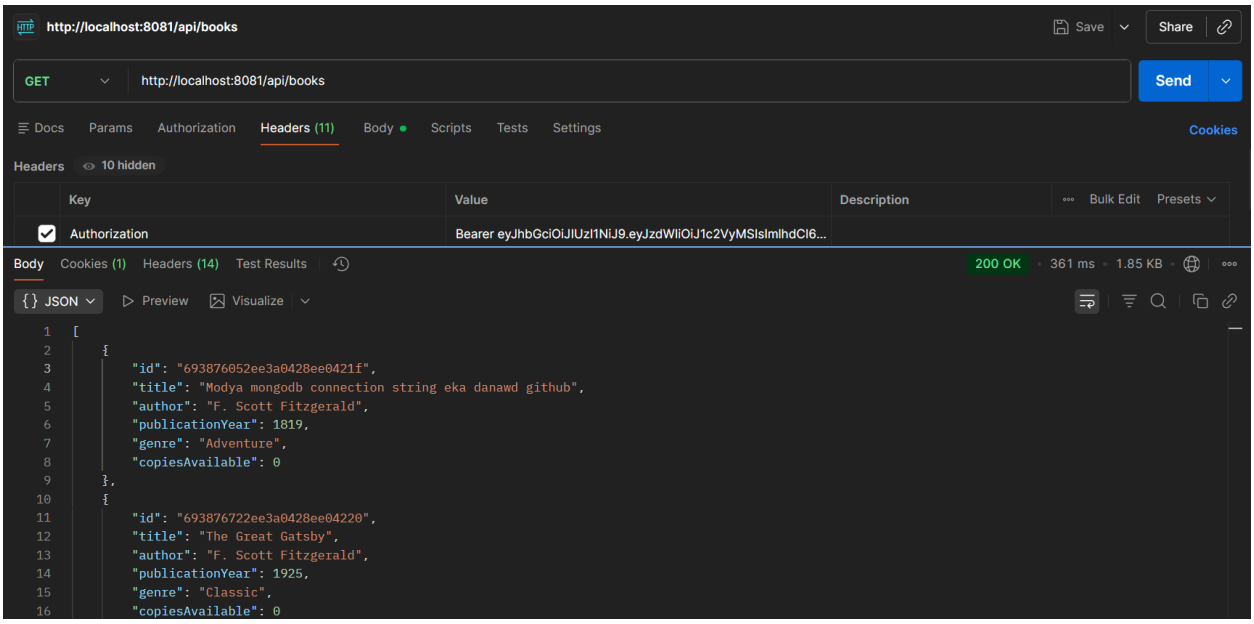
Login to Get JWT Token



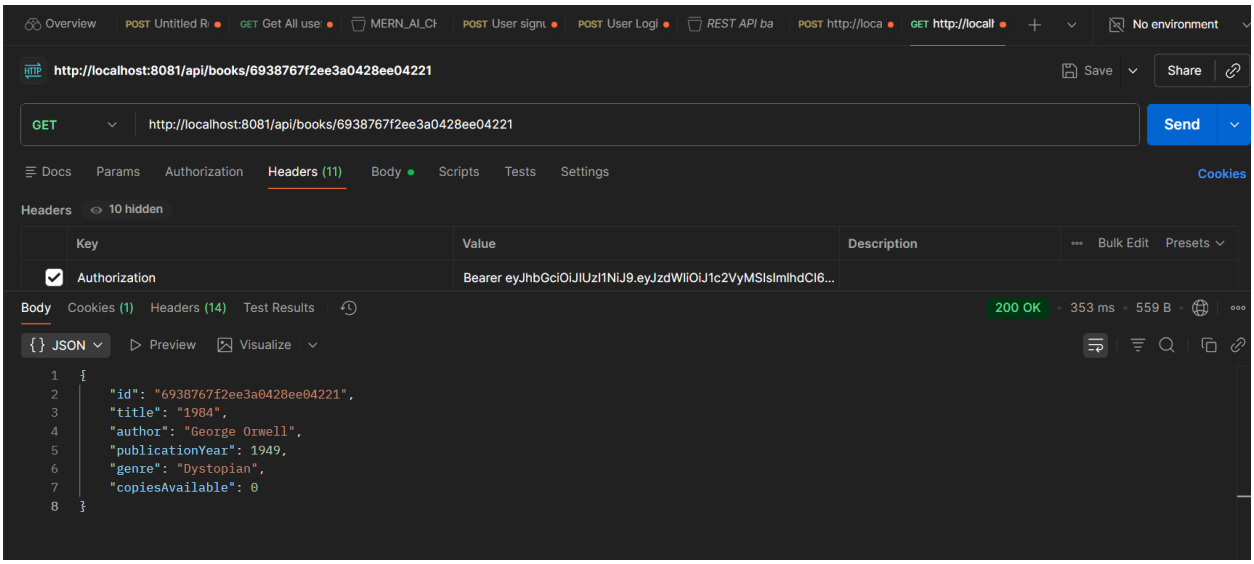


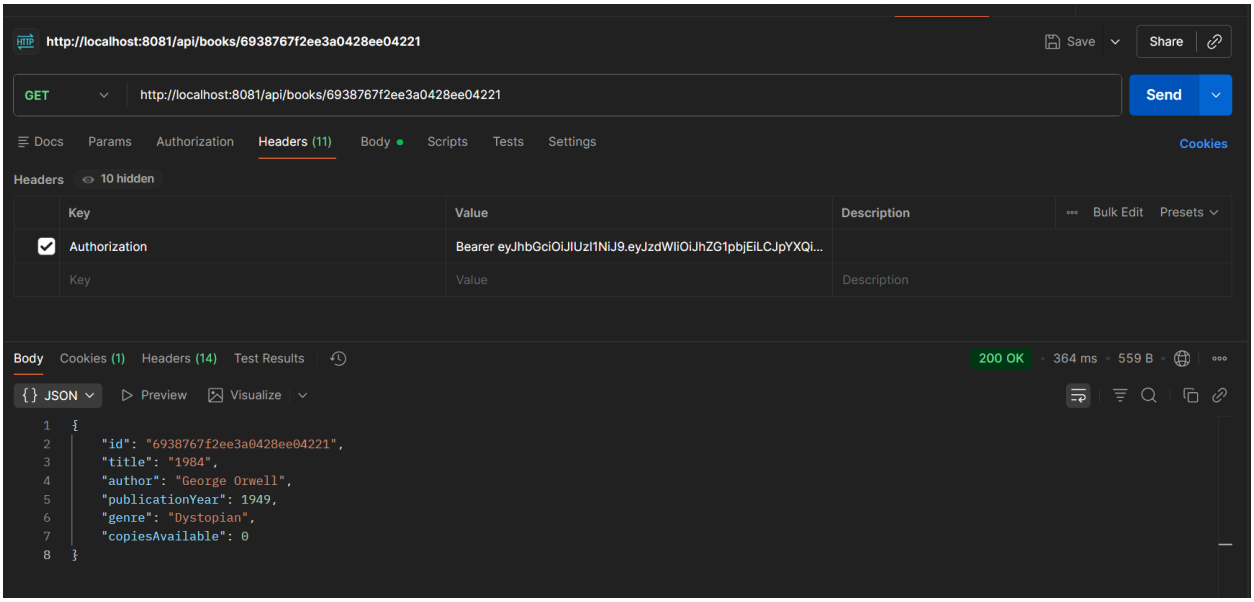
Test GET /api/books



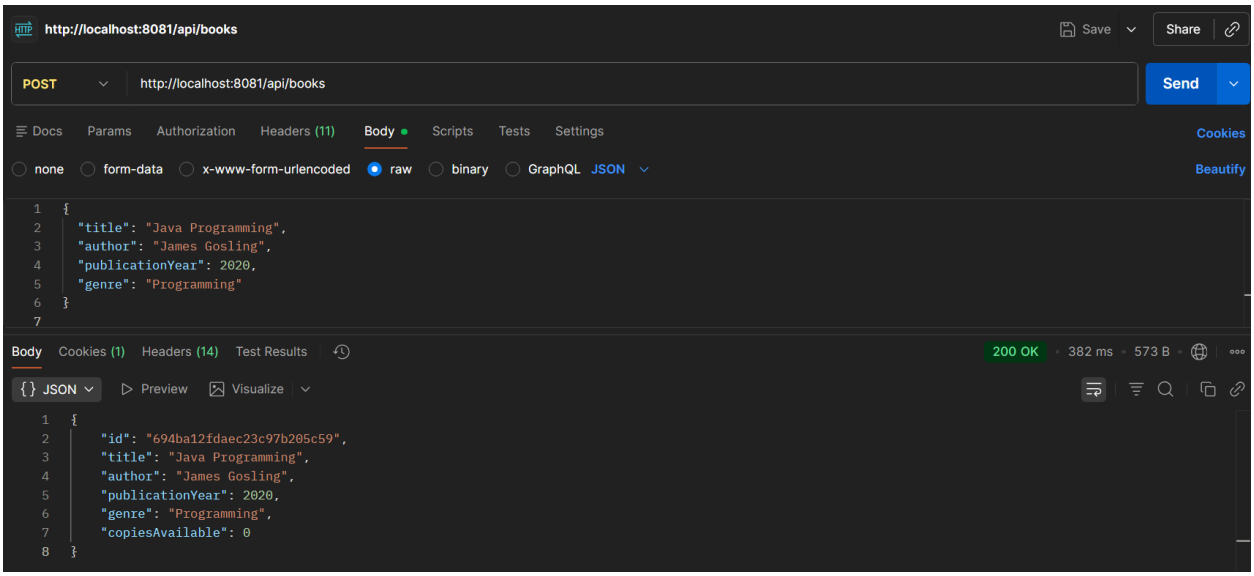


Test GET /api/books/{id}

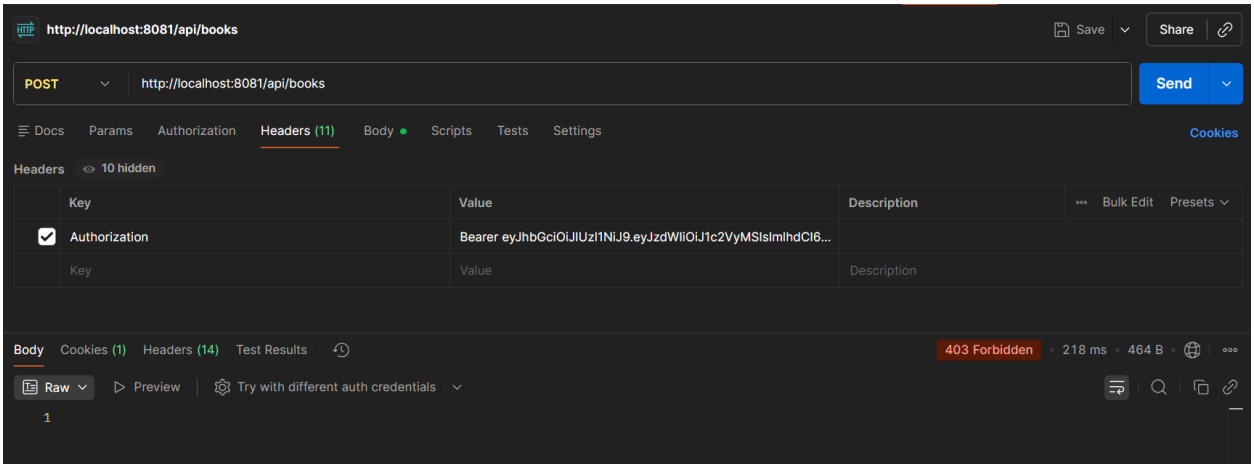




POST /api/books

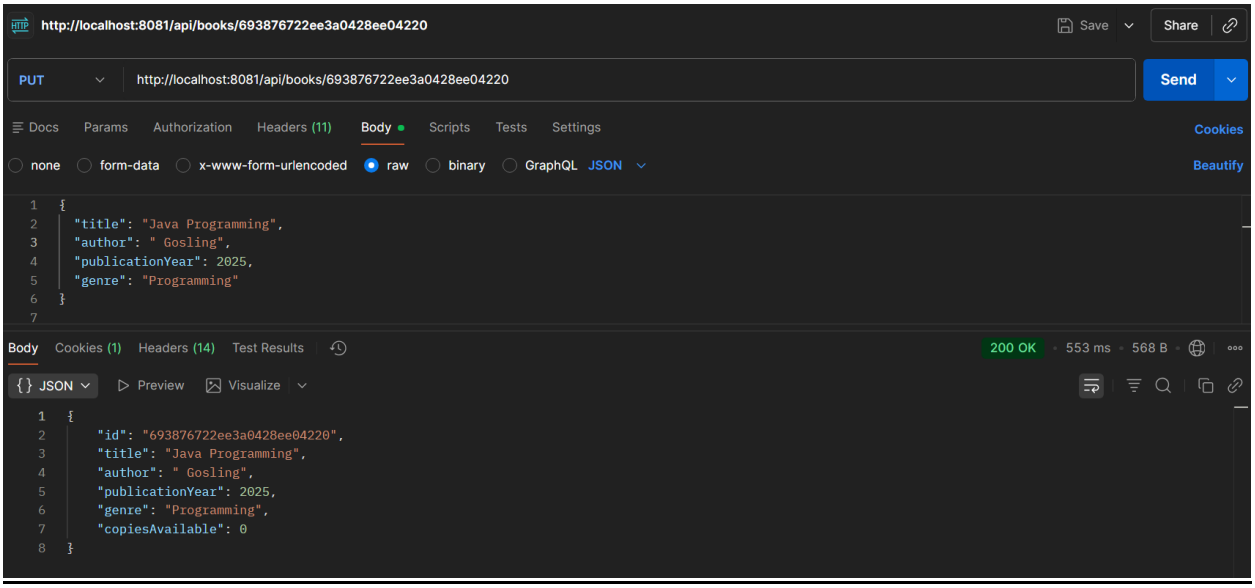


For users

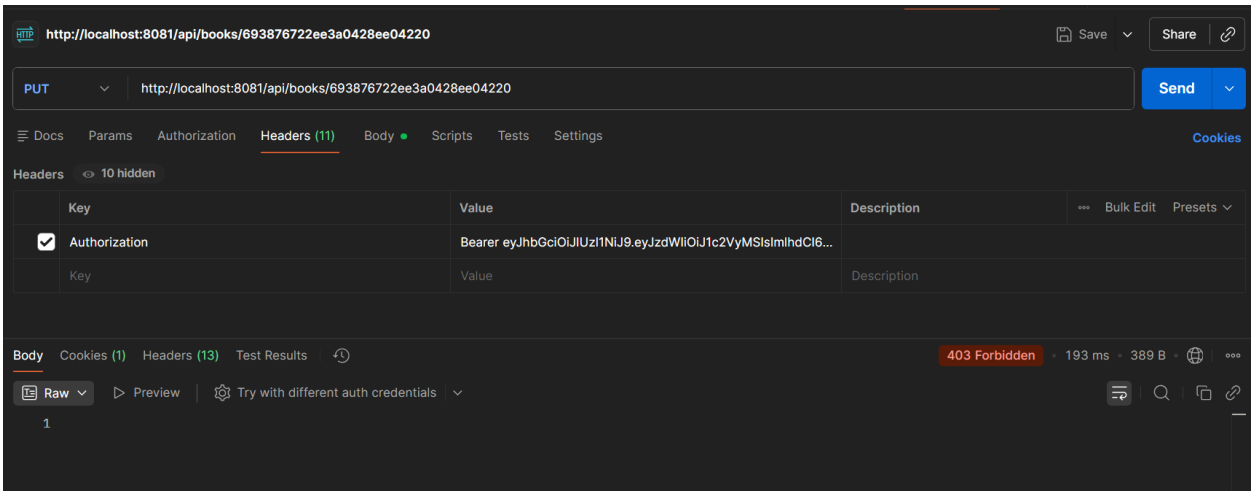


Test PUT /api/books/{id}

For admin

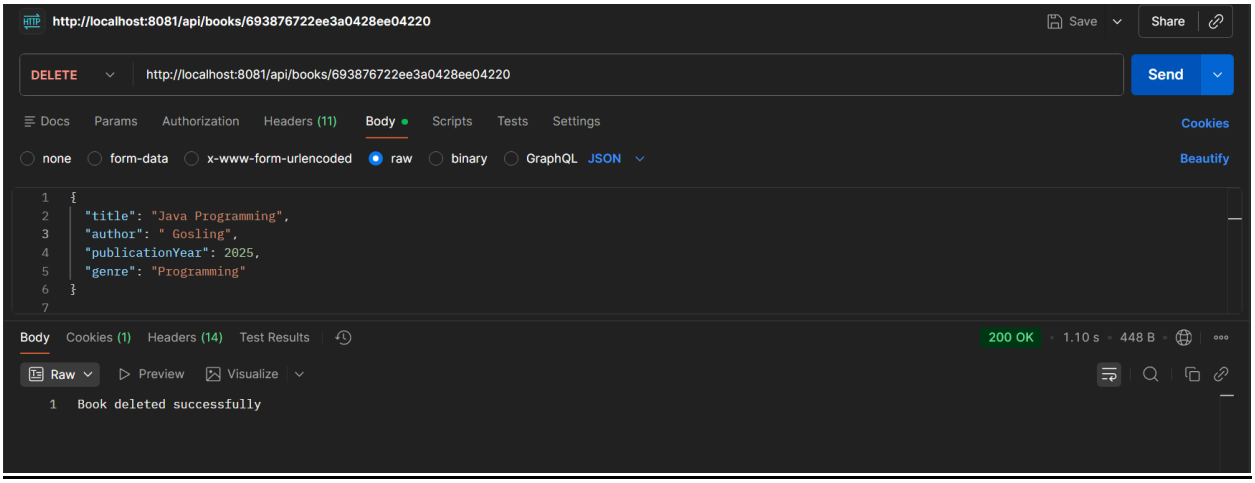


For users



Test DELETE /api/books/{id}

For admin



For users