Spring Boot OAuth2

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Important Links

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# OAuth2 Boot

If you have spring-security-oauth2 on your classpath, you can take advantage of some auto-configuration to simplify setting up Authorization and Resource Servers.

# Authorization Server

Spring Security OAuth2 Boot simplifies standing up an OAuth 2.0 Authorization Server.

## Do I Need to Stand Up My Own Authorization Server?

You need to stand up your own authorization server if:

* You want to delegate the operations of sign-in, sign-out, and password recovery to a separate service (also called identity federation) that you want to manage yourself and
* You want to use the OAuth 2.0 protocol for this separate service to coordinate with other services

## Dependencies

To use the auto-configuration features in this library, you need spring-security-oauth2, which has the OAuth 2.0 primitives and **spring-security-oauth2-autoconfigure**. Note that you need to specify the version for spring-security-oauth2-autoconfigure, since it is not managed by Spring Boot any longer, though it should match Boot’s version anyway.

For JWT support, you also need spring-security-jwt.

## Minimal OAuth2 Boot Configuration

Creating a minimal Spring Boot authorization server consists of three basic steps:

* Including the dependencies.
* Including the **@EnableAuthorizationServer** annotation.
* Specifying **at least one client ID and secret** pair.

### Enabling the Authorization Server

Similar to other Spring Boot **@Enable** annotations, you can add the **@EnableAuthorizationServer** annotation to the class that contains your main method, as the following example shows:

*@EnableAuthorizationServer*

*@SpringBootApplication*

public class SimpleAuthorizationServerApplication {

public static void main(String[] args) {

SpringApplication.run(SimpleAuthorizationServerApplication, args);

}

}

Adding this annotation imports other Spring configuration files that add a **number of reasonable defaults**, such as how tokens ought to be signed, their duration, and what grants to allow.

### Specifying a Client and Secret

By spec, numerous OAuth 2.0 endpoints require **client authentication**, so you need to specify at least one client in order for anyone to be able to communicate with your authorization server.

The following example shows how to specify a client:

security:

oauth2:

client:

client-id: first-client

client-secret: noonewilleverguess

### Retrieving a Token

OAuth 2.0 is essentially a framework that specifies strategies for exchanging long-lived tokens for short-lived ones.

By default, **@EnableAuthorizationServer**grants a client access to client credentials, which means you can do something like the following:

**curl first-client:noonewilleverguess@localhost:8080/oauth/token -dgrant\_type=client\_credentials -dscope=any**

The application responds with a token similar to the following:

{

"access\_token" : "f05a1ea7-4c80-4583-a123-dc7a99415588",

"token\_type" : "bearer",

"expires\_in" : 43173,

"scope" : "any"

}

This token can be presented to any resource server that supports opaque OAuth 2.0 tokens and is configured to point at this authorization server for verification.

## How to Switch Off OAuth2 Boot’s Auto Configuration

Basically, the OAuth2 Boot project creates an instance of [**AuthorizationServerConfigurer**](https://projects.spring.io/spring-security-oauth/docs/oauth2.html#authorization-server-configuration) with some reasonable defaults:

* It registers a **NoOpPasswordEncoder** (overriding [the Spring Security default](https://docs.spring.io/spring-security/site/docs/current/reference/htmlsingle/#core-services-password-encoding))
* It lets the client you provided use any grant type this server supports: **authorization\_code, password, client\_credentials, implicit, or refresh\_token**.

Otherwise, it also tries to pick up a handful of beans, if they are defined — namely:

* **AuthenticationManager**: For looking up end users (not clients)
* **TokenStore**: For generating and retrieving tokens
* **AccessTokenConverter**: For converting access tokens into different formats, such as JWT.

If you expose a bean of type **AuthorizationServerConfigurer**, none of this is done automatically.

So, for example, if you need to configure more than one client, change their allowed grant types, or use **something better than the no-op password encoder** (highly recommended!), then you want to expose your own AuthorizationServerConfigurer, as the following example shows:

@Configuration

public class AuthorizationServerConfig extends AuthorizationServerConfigurerAdapter {

@Autowired DataSource dataSource;

protected void configure(ClientDetailsServiceConfigurer clients) {

clients

.jdbc(this.dataSource)

.passwordEncoder(PasswordEncoderFactories.createDelegatingPasswordEncoder());

}

}

**The preceding configuration causes OAuth2 Boot to no longer retrieve the client from environment properties and now falls back to the Spring Security password encoder default.**

## How to Make Authorization Code Grant Flow Work

With the default configuration, while the Authorization Code Flow is technically allowed, it is not completely configured.

This is because, in addition to what comes pre-configured, the Authorization Code Flow requires:

* **End users**
* An **end-user login flow**, and
* A **redirect URI registered with the client**

### Adding End Users

In a typical Spring Boot application secured by Spring Security, [users are defined by a **UserDetailsService**](https://docs.spring.io/spring-security/site/docs/current/reference/htmlsingle/#tech-userdetailsservice). In that regard, an authorization server is no different, as the following example shows:

*@EnableWebSecurity*

public class WebSecurityConfig extends WebSecurityConfigurerAdapter {

*@Bean*

*@Override*

public UserDetailsService userDetailsService() {

return new InMemoryUserDetailsManager(

User.withDefaultPasswordEncoder()

.username("enduser")

.password("password")

.roles("USER")

.build());

}

}

Note that, as is typical of a Spring Security web application, users are defined in a **WebSecurityConfigurerAdapter** instance.

### Adding an End-User Login Flow

Incidentally, adding an instance of **WebSecurityConfigurerAdapter is all we need for now to add a form login flow for end users**. However, note that this is where any other configuration regarding the web application itself, not the OAuth 2.0 API, goes.

If you want to **customize** the **login** page, offer more than just form login for the user, or add additional support like password recovery, the **WebSecurityConfigurerAdapter** picks it up.

### Registering a Redirect URI With the Client

<https://stackoverflow.com/questions/32219656/how-to-use-jdbcclientdetailsservice-of-spring-security-oauth2>

OAuth2 Boot does not support configuring a redirect URI as a property — say, alongside client-id and client-secret.

To add a redirect URI, you need to specify the client by using either InMemoryClientDetailsService or JdbcClientDetailsService.

Doing either means [replacing the OAuth2 Boot-provided AuthorizationServerConfigurer](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/reference/htmlsingle/) with your own, as the following example shows:

*@Configuration*

public class AuthorizationServerConfig extends AuthorizationServerConfigurerAdapter {

*@Bean*

PasswordEncoder passwordEncoder() {

return PasswordEncoderFactories.createDelegatingPasswordEncoder();

}

protected void configure(ClientDetailsServiceConfigurer clients) {

clients

.inMemory()

.withClient("first-client")

.secret(passwordEncoder().encode("noonewilleverguess"))

.scopes("resource:read")

.authorizedGrantTypes("authorization\_code")

.redirectUris("http://localhost:8081/oauth/login/client-app");

}

}

### Testing Authorization Code Flow

<https://stackoverflow.com/questions/29510759/how-to-test-spring-security-oauth2-resource-server-security>

Testing OAuth can be tricky since it requires more than one server to see the full flow in action. However, the first steps are straight-forward:

* Browse to <http://localhost:8080/oauth/authorize?grant_type=authorization_code&response_type=code&client_id=first-client&state=1234>
* The application, if the user is not logged in, redirects to the login page, at <http://localhost:8080/login>
* Once the user logs in, the application generates a code and redirects to the registered redirect URI — in this case, <http://localhost:8081/oauth/login/client-app>

The flow could continue at this point by standing up any resource server that is configured for [**opaque tokens**](https://auth0.com/docs/tokens) and is pointed at this authorization server instance.

### JSON Web Tokens

For more information on all the types of tokens used by Auth0.

JSON Web Token (JWT), pronounced "jot", is an open standard **(RFC 7519)** that defines a compact and self-contained way for securely transmitting information between parties as a JSON object.

**Compact**: Because of its relatively small size, a JWT can be sent through a URL, through a POST parameter, or inside an HTTP header, and it is transmitted quickly.

**Self-contained**: A JWT contains all the required information about an entity to avoid querying a database more than once. The recipient of a JWT also does not need to call a server to validate the token.

The information contained within the JSON object can be verified and trusted because it is digitally signed. Although JWTs can also be encrypted to provide secrecy between parties like signed tokens.

JWTs can be signed using a secret (with the HMAC algorithm) or a **public/private key pair using RSA or ECDSA**. When tokens are signed using public/private key pairs, the signature also certifies that only the party holding the private key is the one that signed it.

### Use of JWTs

JWT is a standard, which means that all JWTs are tokens, but not all tokens are JWTs. JWTs can be used in varying ways:

**Authentication**: When a user successfully logs in using their credentials, an ID Token is returned. According to the OpenID Connect (OIDC) specs, an ID Token is always a JWT.

**Authorization**: Once a user is successfully logged in, an application may request to access routes, services, or resources on behalf of that user. To do so, it uses an Access Token, which may be in the form of a JWT. Each subsequent request includes the access token. Single Sign-on (SSO) widely uses JWT because of the small overhead of the format, and its ability to easily be used across different domains.

**Information Exchange**: JWTs are a good way of securely transmitting information between parties because they can be signed, which means you can be sure that the senders are who they say they are. Additionally, the structure of a JWT allows you to verify that the content hasn't been tampered with.

## How to Make Password Grant Flow Work

With the default configuration, while the Password Flow is technically possible, it, like Authorization Code, is missing users.

That said, because the default configuration creates a user with a username of user and a randomly-generated password, you can hypothetically check the logs for the password and do the following:

**curl first-client:noonewilleverguess@localhost:8080/oauth/token -dgrant\_type=password -dscope=any -dusername=user -dpassword=the-password-from-the-logs**

When you run that command, you should get a token back. More likely, though, you want to specify a set of users.

*@EnableWebSecurity*

**public** **class** WebSecurityConfig **extends** WebSecurityConfigurerAdapter {

*@Bean*

*@Override*

**public** UserDetailsService userDetailsService() {

**return** **new** InMemoryUserDetailsManager(

User.withDefaultPasswordEncoder()

.username("enduser")

.password("password")

.roles("USER")

.build());

}

}

This is all we need to do. We do not need to override **AuthorizationServerConfigurer**, because the client ID and secret are specified as environment properties.

So, the following should now work:

**curl first-client:noonewilleverguess@localhost:8080/oauth/token -dgrant\_type=password -dscope=any -dusername=enduser -dpassword=password**

## How and When to Give Authorization Server an AuthenticationManager

This is a very common question and is not terribly intuitive when **AuthorizationServerEndpointsConfigurer** needs an **AuthenticationManager** instance to be specified. The short answer is: Only when using [the Resource Owner Password Flow](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/reference/htmlsingle/#oauth2-boot-authorization-server-password-grant).

It helps to remember a few fundamentals:

* An **AuthenticationManager** is an abstraction for authenticating users. It typically needs some kind of **UserDetailsService** to be specified in order to be complete.
* End users are specified in a **WebSecurityConfigurerAdapter**.
* OAuth2 Boot, by default, automatically picks up any exposed **AuthenticationManager**.

However, not all flows require an **AuthenticationManager** because not all flows have end users involved. For example, the Client Credentials flow asks for a token based only on the client’s authority, not the end user’s. And the Refresh Token flow asks for a token based only on the authority of a refresh token.

Also, not all flows specifically require the OAuth 2.0 API itself to have an **AuthenticationManager**, either. For example, the Authorization Code and Implicit flows verify the user when they login (application flow), not when the token (OAuth 2.0 API) is requested.

Only the Resource Owner Password flow returns a code based off of the end user’s credentials. This means that the Authorization Server only needs an **AuthenticationManager** when clients are using the Resource Owner Password flow.

The following example shows the Resource Owner Password flow:

.authorizedGrantTypes("password", ...)

In the preceding flow, your Authorization Server needs an instance of **AuthenticationManager**.

There are a few ways to do this ([remember the fundamentals from earlier](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/reference/htmlsingle/#boot-features-security-oauth2-authorization-server)):

* Leave the OAuth2 Boot defaults (you are not exposing a **AuthorizationServerConfigurer**) and [expose a **UserDetailsService**](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/reference/htmlsingle/#oauth2-boot-authorization-server-password-grant-user-details-service).
* Leave the OAuth2 Boot defaults and [expose an **AuthenticationManager**](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/reference/htmlsingle/#oauth2-boot-authorization-server-password-grant-authentication-manager).
* Override **AuthorizationServerConfigurerAdapter** (removing OAuth2 Boot’s defaults) and [depend on **AuthenticationConfiguration**](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/reference/htmlsingle/#oauth2-boot-authorization-server-password-grant-authentication-configuration).
* Override **AuthorizationServerConfigurerAdapter** and [manually wire the **AuthenticationManager**](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/reference/htmlsingle/#oauth2-boot-authorization-server-password-grant-autowired-authentication-manager).

### Exposing a UserDetailsService

End users are specified in a **WebSecurityConfigurerAdapter** through a **UserDetailsService**. So, if you use the OAuth2 Boot defaults (meaning you haven’t implemented a **AuthorizationServerConfigurer**), you can expose a **UserDetailsService** and be done, as the following example shows:

*@EnableWebSecurity*

**public** **class** WebSecurityConfig **extends** WebSecurityConfigurerAdapter {

*@Autowired* DataSource dataSource;

*@Bean*

*@Override*

**public** UserDetailsService userDetailsService() {

**return** **new** JdbcUserDetailsManager(**this**.dataSource);

}

}

### Exposing an AuthenticationManager

In case you need to do more specialized configuration of the AuthenticationManager, you can do so in the WebSecurityConfigurerAdapter and then expose it, as the following example shows:

*@EnableWebSecurity*

**public** **class** WebSecurityConfig **extends** WebSecurityConfigurerAdapter {

*@Bean(BeansId.AUTHENTICATION\_MANAGER)*

*@Override*

**public** AuthenticationManager authenticationManagerBean() {

**return** **super**.authenticationManagerBean();

}

*@Override*

**protected** **void** configure(AuthenticationManagerBuilder auth) {

auth.authenticationProvider(customAuthenticationProvider());

}

}

If you use the OAuth2 Boot defaults, then it picks up the bean automatically.

### Depending on AuthenticationConfiguration

Any configured AuthenticationManager is available in AuthenticationConfiguration. This means that, if you need to have an AuthorizationServerConfigurer (in which case you need to do your own autowiring), you can have it depend on AuthenticationConfiguration to get the AuthenticationManager bean, as the following class shows:

*@Component*

**public** **class** CustomAuthorizationServerConfigurer **extends**

AuthorizationServerConfigurerAdapter {

AuthenticationManager authenticationManager;

**public** CustomAuthorizationServerConfigurer(AuthenticationConfiguration authenticationConfiguration) {

**this**.authenticationManager = authenticationConfiguration.getAuthenticationManager();

}

*@Override*

**public** **void** configure(ClientDetailsServiceConfigurer clients) {

*// .. your client configuration that allows the password grant*

}

*@Override*

**public** **void** configure(AuthorizationServerEndpointsConfigurer endpoints) {

endpoints.authenticationManager(authenticationManager);

}

}

*@EnableWebSecurity*

**public** **class** WebSecurityConfig **extends** WebSecurityConfigurerAdapter {

*@Bean*

*@Override*

**public** UserDetailsService userDetailsService() {

**return** **new** MyCustomUserDetailsService();

}

}

### Manually Wiring An AuthenticationManager

In the most sophisticated case, where the **AuthenticationManager** needs special configuration and you have your own **AuthenticationServerConfigurer**, then you need to both create your own **AuthorizationServerConfigurerAdapter** and your own **WebSecurityConfigurerAdapter**:

*@Component*

**public** **class** CustomAuthorizationServerConfigurer **extends**

AuthorizationServerConfigurerAdapter {

AuthenticationManager authenticationManager;

**public** CustomAuthorizationServerConfigurer(AuthenticationManager authenticationManager) {

**this**.authenticationManager = authenticationManager;

}

*@Override*

**public** **void** configure(ClientDetailsServiceConfigurer clients) {

*// .. your client configuration that allows the password grant*

}

*@Override*

**public** **void** configure(AuthorizationServerEndpointsConfigurer endpoints) {

endpoints.authenticationManager(authenticationManager);

}

}

*@EnableWebSecurity*

**public** **class** WebSecurityConfig **extends** WebSecurityConfigurerAdapter {

*@Bean(BeansId.AUTHENTICATION\_MANAGER)*

*@Override*

**public** AuthenticationManager authenticationManagerBean() {

**return** **super**.authenticationManagerBean();

}

*@Override*

**protected** **void** configure(AuthenticationManagerBuilder auth) {

auth.authenticationProvider(customAuthenticationProvider());

}

}

## Is Authorization Server Compatible with Spring Security 5.1 Resource Server and Client?

No, not out of the box. Spring Security 5.1 supports only JWT-encoded JWK-signed authorization, and Authorization Server does not ship with a JWK Set URI.

Basic support is possible, though.

In order to configure Authorization Server to be compatible with Spring Security 5.1 Resource Server, for example, you need to do the following:

* Configure it to use JWKs
* Add a JWK Set URI endpoint

### Configuring Authorization Server to Use JWKs

To change the format used for access and refresh tokens, you can change out the AccessTokenConverter and the TokenStore, as the following example shows:

*@EnableAuthorizationServer*

*@Configuration*

**public** **class** JwkSetConfiguration **extends** AuthorizationServerConfigurerAdapter {

AuthenticationManager authenticationManager;

KeyPair keyPair;

**public** JwkSetConfiguration(AuthenticationConfiguration authenticationConfiguration,

KeyPair keyPair) **throws** Exception {

**this**.authenticationManager = authenticationConfiguration.getAuthenticationManager();

**this**.keyPair = keyPair;

}

*// ... client configuration, etc.*

*@Override*

**public** **void** configure(AuthorizationServerEndpointsConfigurer endpoints) {

*// @formatter:off*

endpoints

.authenticationManager(**this**.authenticationManager)

.accessTokenConverter(accessTokenConverter())

.tokenStore(tokenStore());

*// @formatter:on*

}

*@Bean*

**public** TokenStore tokenStore() {

**return** **new** JwtTokenStore(accessTokenConverter());

}

*@Bean*

**public** JwtAccessTokenConverter accessTokenConverter() {

JwtAccessTokenConverter converter = **new** JwtAccessTokenConverter();

converter.setKeyPair(**this**.keyPair);

**return** converter;

}

}

### Add a JWK Set URI Endpoint

Spring Security OAuth does not support JWKs, nor does @EnableAuthorizationServer support adding more OAuth 2.0 API endpoints to its initial set. However, we can add this with only a few lines.

First, you need to add another dependency: com.nimbusds:nimbus-jose-jwt. This gives you the appropriate JWK primitives.

Second, instead of using @EnableAuthorizationServer, you need to directly include its two @Configuration classes:

* AuthorizationServerEndpointsConfiguration: The @Configuration class for configuring the OAuth 2.0 API endpoints, such as what format to use for the tokens.
* AuthorizationServerSecurityConfiguration: The @Configuration class for the access rules around those endpoints. This is the one that you need to extend, as shown in the following example:

*@FrameworkEndpoint*

**class** JwkSetEndpoint {

KeyPair keyPair;

**public** JwkSetEndpoint(KeyPair keyPair) {

**this**.keyPair = keyPair;

}

*@GetMapping("/.well-known/jwks.json")*

*@ResponseBody*

**public** Map<String, Object> getKey(Principal principal) {

RSAPublicKey publicKey = (RSAPublicKey) **this**.keyPair.getPublic();

RSAKey key = **new** RSAKey.Builder(publicKey).build();

**return** **new** JWKSet(key).toJSONObject();

}

}

*@Configuration*

**class** JwkSetEndpointConfiguration **extends** AuthorizationServerSecurityConfiguration {

*@Override*

**protected** **void** configure(HttpSecurity http) **throws** Exception {

**super**.configure(http);

http

.requestMatchers()

.mvcMatchers("/.well-known/jwks.json")

.and()

.authorizeRequests()

.mvcMatchers("/.well-known/jwks.json").permitAll();

}

}

Then, since you do not need to change AuthorizationServerEndpointsConfiguration, you can @Import it instead of using @EnableAuthorizationServer, as the following example shows:

*@Import(AuthorizationServerEndpointsConfiguration.class)*

*@Configuration*

**public** **class** JwkSetConfiguration **extends** AuthorizationServerConfigurerAdapter {

*// ... the rest of the configuration from the previous section*

}

### Testing Against Spring Security 5.1 Resource Server

Now you can POST to the /oauth/token endpoint ([as before](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/reference/htmlsingle/#oauth2-boot-testing-authorization-code-flow)) to obtain a token and then present that to a [Spring Security 5.1 Resource Server](https://github.com/spring-projects/spring-security/tree/master/samples/boot/oauth2resourceserver).

# 2. Resource Server

Spring Security OAuth2 Boot simplifies protecting your resources using Bearer Token authentication in two different token formats: JWT and Opaque.

## Dependencies

To use the auto-configuration features in this library, you need **spring-security-oauth2**, which has the OAuth 2.0 primitives and **spring-security-oauth2-autoconfigure**. Note that you need to specify the version for **spring-security-oauth2-autoconfigure**, since it is not managed by Spring Boot any longer, though it should match Boot’s version anyway.

For JWT support, you also need **spring-security-jwt**.

## Minimal OAuth2 Boot Configuration

Creating a minimal Spring Boot resource server consists of three basic steps:

1. Including the dependencies.
2. Including the **@EnableResourceServer** annotation.
3. Specifying a strategy for verifying the bearer token.

### Enabling the Resource Server

Similar to other Spring Boot **@Enable** annotations, you can add the **@EnableResourceServer**annotation to the class that contains your main method, as the following example shows:

***@EnableResourceServer***

***@SpringBootApplication***

**public class SimpleAuthorizationServerApplication {**

**public static void main(String[] args) {**

**SpringApplication.run(SimpleAuthorizationServerApplication, args);**

**}**

**}**

Adding this annotation adds the OAuth2AuthenticationProcessingFilter, though it will need one more configuration to know how to appropriately process and validate tokens.

### Specifying a Token Verification Strategy

Bearer Tokens typically come in one of two forms: JWT-encoded or opaque. You will need to configure the resource server with one or the other strategy.

#### JWT

To indicate JWT, simply specify the JWK Set Uri hosted on your Authorization Server:

**spring:**

**security:**

**oauth2:**

**resource:**

**jwk:**

**key-set-uri: https://idp.example.com/.well-known/jwks.json**

Instead of a JWK Set Uri, you can also specify a key.

Note that with this configuration, your authorization server needs to be up in order for Resource Server to start up.

#### Opaque

To indicate opaque, simply specify the Authorization Server endpoint that knows how to decode the token:

spring:

security:

oauth2:

resource:

token-info-uri: <https://idp.example.com/oauth2/introspect>

It’s likely this endpoint requires some kind of authorization separate from the token itself, for example, client authentication.

### Accessing a Resource

To confirm that Resource Server is correctly processing tokens, you can add a simple controller endpoint like so:

***@RestController***

**public class SimpleController**

***@GetMapping("/whoami")***

**public String whoami(*@AuthenticationPrincipal(expression="name")* String name) {**

**return name;**

**}**

**}**

Then, obtain an active access token from your Authorization Server and present it to the Resource Server:

curl -H "Authorization: $TOKEN" http://localhost:8080/whoami

And you should see the value of the user\_name attribute in the token.

## How to Use JWT with a Single Key

Instead of a JWK Set endpoint, you may have a local key you want to configure for verification. While this is weaker due to the key being static, it may be necessary in your situation.

Configuring the resource server with the appropriate symmetric key or PKCS#8 PEM-encoded public key is simple, as can be seen below:

**spring:**

**security:**

**oauth2:**

**resource:**

**jwt:**

**key-value: |**

**-----BEGIN PUBLIC KEY-----**

**MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKC...**

**-----END PUBLIC KEY-----**

You can also instead supply a key-store, key-store-password, key-alias, and key-password properties.

Or you can use the key-uri endpoint to get the key remotely from your authorization server, which is something of a happy medium between static, local configuration and a JWK Set endpoint.

## How to Configure the Token Info Endpoint

The token info endpoint, also sometimes called the introspection endpoint, likely requires some kind of client authentication, either Basic or Bearer. Generally speaking, the bearer token in the SecurityContext won’t suffice since that is tied to the user. Instead, you’ll need to specify credentials that represent this client, like so:

spring:

security:

oauth2:

client:

clientId: client-id

clientSecret: client-secret

resource:

tokenInfoUri: https://idp.example.com/oauth2/check\_token

By default, this will use Basic authentication, using the configured credentials, to authenticate against the token info endpoint.

## How to Configure the User Info Endpoint

It’s atypical for a resource server to need to call a user info endpoint. This is because, fundamentally, a resource server is about authorizing a request, not authenticating it. That said, it is at times necessary.

If you specify a user info endpoint like so:

**spring:**

**security:**

**oauth2:**

**resource:**

**userInfoUri**: https://idp.example.com/oauth2/userinfo

Then Resource Server will send it the bearer token that is part of the request and enhance the Authentication object with the result.

### Customizing the User Info Request

Internally, Resource Server uses an OAuth2RestTemplate to invoke the /userinfo endpoint. At times, it may be necessary to add filters or perform other customization for this invocation. To customize the creation of this bean, you can expose a UserInfoRestTemplateCustomizer, like so:

*@Bean*

public UserInfoRestTemplateCustomizer customHeader() {

return restTemplate ->

restTemplate.getInterceptors().add(new MyCustomInterceptor());

}

This bean will be handed to a UserInfoTemplateFactory which will add other configurations helpful to coordinating with the /userinfo endpoint.

And, of course, you can replace the UserInfoTemplateFactory completely, if you need complete control over `OAuth2RestTemplate’s configuration.

## Customizing Authorization Rules

Similar to how Spring Security works, you can customize authorization rules by endpoint in Spring Security OAuth, like so:

**public** **class** HasAuthorityConfig

**extends** ResourceServerConfigurerAdapter {

*@Override*

**public** **void** configure(HttpSecurity http) **throws** Exception {

*// @formatter:off*

http

.authorizeRequests()

.antMatchers("/flights/\*\*").hasAuthority("#oauth2.hasScope('message:read')")

.anyRequest().authenticated();

*// @formatter:on*

}

Though, note that if a server is configured both as a resource server and as an authorization server, then there are certain endpoint that require special handling. To avoid configuring over the top of those endpoints (like /token), it would be better to isolate your resource server endpoints to a targeted directory like so:

**public** **class** ResourceServerEndpointConfig

**extends** ResourceServerConfigurerAdapter {

*@Override*

**public** **void** configure(HttpSecurity http) **throws** Exception {

*// @formatter:off*

http

.antMatchers("/resourceA/\*\*", "/resourceB/\*\*")

.authorizeRequests()

.antMatchers("/resourceA/\*\*").hasAuthority("#oauth2.hasScope('resourceA:read')")

.antMatchers("/resourceB/\*\*").hasAuthority("#oauth2.hasScope('resourceB:read')")

.anyRequest().authenticated();

*// @formatter:on*

}

As the above configuration will target your resource endpoints and not affect authorization server-specific endpoints.

## Less Common Features

### Changing the Token Type

Google and certain other third-party identity providers are more strict about the token type name that is sent in the headers to the user info endpoint. The default is Bearer, which suits most providers and matches the spec. However, if you need to change it, you can set security.oauth2.resource.token-type.

### Changing the Filter Order

OAuth2 resources are protected by a filter chain with the order specified by security.oauth2.resource.filter-order. The default is, after the filter, protecting the actuator endpoints (so actuator endpoints stay on HTTP Basic unless you change the order).

### Permitting the /error Endpoint

Resource Server, when also configured as a client, may rely on a request-scoped OAuth2ClientContext bean during the authentication process. And, in some error situations, Resource Server forwards to the ERROR servlet dispatcher.

By default, request-scoped beans aren’t available in the ERROR dispatch. And, because of this, you may see a complaint about the OAuth2ClientContext bean not being available.

The simplest approach may be to permit the /error endpoint, so that Resource Server doesn’t try and authenticate the request:

**public** **class** PermitErrorConfig **extends** ResourceServerConfigurerAdapter {

*@Override*

**public** **void** configure(HttpSecurity http) **throws** Exception {

*// @formatter:off*

http

.authorizeRequests()

.antMatchers("/error").permitAll()

.anyRequest().authenticated();

*// @formatter:on*

}

}

Other solutions are to configure Spring so that the RequestContextFilter is registered with the error dispatch or to register a RequestContextListener bean.

# Client

To make your web application into an OAuth2 client, you can add @EnableOAuth2Client and Spring Boot creates an OAuth2ClientContext and OAuth2ProtectedResourceDetails that are necessary to create an OAuth2RestOperations. Spring Boot does not automatically create such a bean, but you can easily create your own, as the following example shows:

*@Bean*

**public** OAuth2RestTemplate oauth2RestTemplate(OAuth2ClientContext oauth2ClientContext,

OAuth2ProtectedResourceDetails details) {

**return** **new** OAuth2RestTemplate(details, oauth2ClientContext);

}

You may want to add a qualifier and review your configuration, as more than one RestTemplate may be defined in your application.

This configuration uses security.oauth2.client.\* as credentials (the same as you might be using in the Authorization Server). However, in addition, it needs to know the authorization and token URIs in the Authorization Server, as the following example shows:

application.yml.

security:

oauth2:

client:

clientId: bd1c0a783ccdd1c9b9e4

clientSecret: 1a9030fbca47a5b2c28e92f19050bb77824b5ad1

accessTokenUri: https://github.com/login/oauth/access\_token

userAuthorizationUri: https://github.com/login/oauth/authorize

clientAuthenticationScheme: form

An application with this configuration redirects to Github for authorization when you attempt to use the OAuth2RestTemplate. If you are already signed into Github. you should not even notice that it has authenticated. These specific credentials work only if your application is running on port 8080 (you can register your own client application in Github or other provider for more flexibility).

To limit the scope that the client asks for when it obtains an access token, you can set security.oauth2.client.scope (comma separated or an array in YAML). By default, the scope is empty, and it is up to Authorization Server to decide what the defaults should be (usually depending on the settings in the client registration that it holds).

There is also a setting for security.oauth2.client.client-authentication-scheme, which defaults to header (but you might need to set it to formif, like Github for instance, your OAuth2 provider does not like header authentication). In fact, the security.oauth2.client.\* properties are bound to an instance of AuthorizationCodeResourceDetails, so all of its properties can be specified.

In a non-web application, you can still create an OAuth2RestOperations, and it is still wired into the security.oauth2.client.\* configuration. In this case, you are asking for is a “client credentials token grant” if you use it (and there is no need to use @EnableOAuth2Client or @EnableOAuth2Sso). To prevent that infrastructure being defined, remove the security.oauth2.client.client-id from your configuration (or make it be an empty string).

# 4. Single Sign On

You can use an OAuth2 Client to fetch user details from the provider (if such features are available) and then convert them into an Authentication token for Spring Security. The Resource Server supports this through the user-info-uri property. This is the basis for a Single Sign On (SSO) protocol based on OAuth2, and Spring Boot makes it easy to participate by providing an annotation @EnableOAuth2Sso. The Github client shown in the preceding section can protect all its resources and authenticate by using the Github /user/ endpoint, by adding that annotation and declaring where to find the endpoint (in addition to thesecurity.oauth2.client.\* configuration already listed earlier):

security:

oauth2:

*# ...*

resource:

userInfoUri: https://api.github.com/user

preferTokenInfo: **false**

Since all paths are secure by default, there is no “home” page that you can show to unauthenticated users and invite them to login (by visiting the /login path, or the path specified by security.oauth2.sso.login-path).

To customize the access rules or paths to protect s(o you can add a “home” page for instance,) you can add @EnableOAuth2Sso to a WebSecurityConfigurerAdapter. The annotation causes it to be decorated and enhanced with the necessary pieces to get the /login path working. In the following example, we simply allow unauthenticated access to the home page at / and keep the default for everything else:

*@Configuration*

**public** **class** WebSecurityConfiguration **extends** WebSecurityConfigurerAdapter {

*@Override*

**protected** **void** configure(HttpSecurity http) **throws** Exception {

http

.authorizeRequests()

.mvcMatchers("/").permitAll()

.anyRequest().authenticated();

}

}

Also, note that, since all endpoints are secure by default, this includes any default error handling endpoints — for example, the /error endpoint. This means that, if there is some problem during Single Sign On that requires the application to redirect to the /error page, this can cause an infinite redirect between the identity provider and the receiving application.

First, think carefully about making an endpoint insecure, as you may find that the behavior is simply evidence of a different problem. However, this behavior can be addressed by configuring the application to permit /error, as the following example shows:

*@Configuration*

**public** **class** WebSecurityConfiguration **extends** WebSecurityConfigurerAdapter {

*@Override*

**protected** **void** configure(HttpSecurity http) **throws** Exception {

http

.authorizeRequests()

.antMatchers("/error").permitAll()

.anyRequest().authenticated();

}

}

# Appendix A. Common Application Properties

You can specify various properties inside your application.properties or application.yml files or as command line switches. This section provides a list of common Spring Boot properties and references to the underlying classes that consume them.

*# SECURITY OAUTH2 CLIENT (*[OAuth2ClientProperties](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/api/org/springframework/boot/autoconfigure/security/oauth2/OAuth2ClientProperties.html))

security.oauth2.client.client-id= *# OAuth2 client id.*

security.oauth2.client.client-secret= *# OAuth2 client secret. A random secret is generated by default*

*# SECURITY OAUTH2 RESOURCES (*[ResourceServerProperties](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/api/org/springframework/boot/autoconfigure/security/oauth2/resource/ResourceServerProperties.html))

security.oauth2.resource.id= *# Identifier of the resource.*

security.oauth2.resource.jwt.key-uri= *# The URI of the JWT token. Can be set if the value is not available and the key is public.*

security.oauth2.resource.jwt.key-value= *# The verification key of the JWT token. Can either be a symmetric secret or PEM-encoded RSA public key.*

security.oauth2.resource.jwk.key-set-uri= *# The URI for getting the set of keys that can be used to validate the token.*

security.oauth2.resource.prefer-token-info=true *# Use the token info, can be set to false to use the user info.*

security.oauth2.resource.service-id=resource *#*

security.oauth2.resource.token-info-uri= *# URI of the token decoding endpoint.*

security.oauth2.resource.token-type= *# The token type to send when using the userInfoUri.*

security.oauth2.resource.user-info-uri= *# URI of the user endpoint.*

*# SECURITY OAUTH2 SSO (*[OAuth2SsoProperties](https://docs.spring.io/spring-security-oauth2-boot/docs/current-SNAPSHOT/api/org/springframework/boot/autoconfigure/security/oauth2/client/OAuth2SsoProperties.html))

security.oauth2.sso.login-path=/login *# Path to the login page, i.e. the one that triggers the redirect to the OAuth2 Authorization Server*