

Securing CNA

Session 08

Stop bad guys from
accessing your resources!!

Requirements?

- How is identity and permission information conveyed?
- How is it decoded and interpreted?
- What data are needed to make the access decision?
- Who is responsible for storing and retrieving the data?
- How can you verify that the request hasn't been tampered with?

OAUTH2

OAuth2 Flow

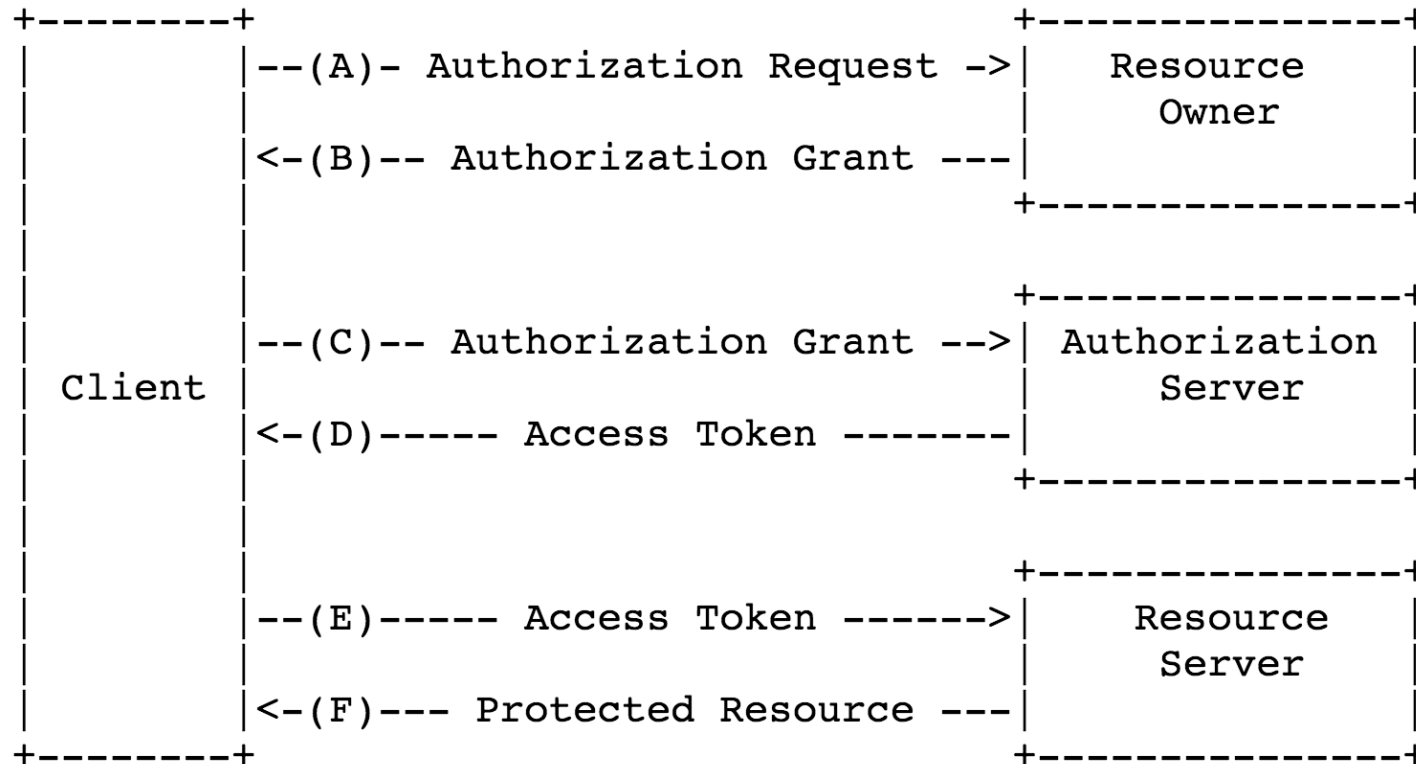


Figure 1: Abstract Protocol Flow

Key Features (1/2)

- IETF standard
- Simple for clients (and developers)
- Tokens carry information (beyond identity)
- Clear separation between users and machines

Key Features (2/2)

- Emphasis on not collecting user credentials in client app
- Machines act on their own or on behalf of users
- Resources are free to interpret token content

OAuth2 and the Microservice

- Example command line Client:

```
$ curl -H "Authorization: Bearer $TOKEN" https://myhost/resource
```

- <https://myhost> is a Resource Server.
- *TOKEN* is a Bearer Token.
- It came from an Authorization Server.

Simple Resource Server

```
@EnableResourceServer
class ResourceServer {
    @Bean
    JwtTokenStore tokenStore() throws Exception {
        JwtAccessTokenConverter enhancer =
            new JwtAccessTokenConverter()
        enhancer.afterPropertiesSet()
        new JwtTokenStore(enhancer)
    }
}
```

NOTE: in a real system you would have to configure the verifierKey (or use JdbcTokenStore)

Simple Authorization Server

```
@EnableAuthorizationServer
class AuthorizationServer extends AuthorizationServerConfigurerAdapter {

    @Override
    void configure(ClientDetailsServiceConfigurer clients) throws Exception {
        clients.inMemory()
            .withClient("my-client-with-secret")...
    }
}
```

Example Token content

- Client ID
- Resource ID (audience)
- Issuer
- User ID
- Role Assignments

JWT Bearer Tokens

- OAuth 2.0 tokens are opaque to clients
- But they carry important information to Resource Servers
- JWT = signed, base64-encoded, JSON

Example JWT Implementation

(from Cloud Foundry UAA)

```
{  "client_id":"cf",
  "exp":1346325625,
  "scope":["cloud_controller.read","openid","password.write"],
  "aud":["openid","cloud_controller","password"],
  "iss": "https://login.run.pivotal.io",
  "user_name":"tester@vmware.com",
  "user_id":"52147673-9d60-4674-a6d9-225b94d7a64e",
  "email":"tester@vmware.com",
  "jti":"f724ae9a-7c6f-41f2-9c4a-526cea84e614" }
```

OAuth2 and the Microservice

- Resource Servers might be Microservices
- Web App Clients: authorization code grant
- **Browser Clients (SPAs):** authorization code grant (better) or implicit grant
- **Mobile and Non-Browser Clients:** password grant (maybe with mods for multifactor etc.)
- **Service Clients (intra-system):** client credentials or relay user token

Spring Cloud Security

- Abstraction over Spring Security OAuth2
- Makes common microservice security use cases easier
- Convention over Configuration
- Smooth UX for deployment on Cloud Foundry

Simple SSO Client

```
@EnableOAuth2Sso  
@Controller  
class Demo {  
}  
  
$ spring jar app.jar app.groovy  
$ cf push -p app.jar
```


How Does That Work? (1/2)

- **Answer:** configuration conventions (the app was bound to a service).

\$ cf bind-service app sso

- and the service provides credentials.

How Does That Work? (2/2)

- To create the same binding manually (e.g. in application.yml)

```
oauth2:  
  client:  
    tokenUri: https://login.run.pivotal.io/oauth/token  
    authorizationUri: https://login.run.pivotal.io/oauth/authorize  
    clientId: acme  
    clientSecret: ${CLIENT_SECRET}  
  resource:  
    tokenInfoUri: http://uaa.run.pivotal.io/check_token  
    id: openid  
    serviceId: ${PREFIX:}resource
```

Resource Server with Spring Cloud

```
@EnableOAuth2Resource
@EnableEurekaClient
@RestController
class Demo {
    @RequestMapping("/")
    def home() { [id: UUID.randomUUID().toString(), content: "Hello Remote"] }
}
```

How Does That Work?

- Same as *@EnableOAuth2Sso*
- Bind to service for conventional external configuration

Single Page Apps

- With backend services CORS restrictions make reverse proxy useful (*@EnableZuulProxy*).
- Then you can acquire tokens in the client app and relay them to back end.

Relaying User Tokens (1/2)

- Front end app sends SSO token with user credentials to authenticate back end requests
- Back ends relay it to each other as necessary.

Relaying User Tokens (2/2)

- **Simple but possibly flawed:** the front end only needs access to user details to authenticate, but you need to give it permission to do other things to allow it access to the back ends.
- **Idea:** exchange (with full authentication) the incoming token for an outgoing one with different permissions (client but not scope). Can use password grant (e.g. with the incoming token as a password).

Token Relay with Spring Cloud

```
@EnableOAuth2Sso  
@EnableZuulProxy  
@Controller  
class Demo {  
}
```

- Autoconfiguration for *@EnableZuulProxy* combined with *@EnableOAuth2Sso*
- Adds *ZuulFilter* that attaches the current user token to downstream requests

Labs!!