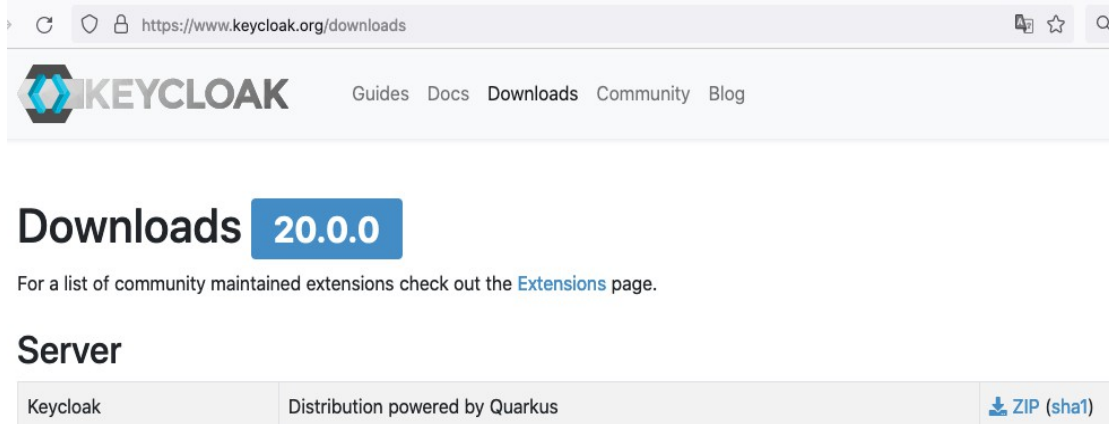


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1 Setup Keycloak Server

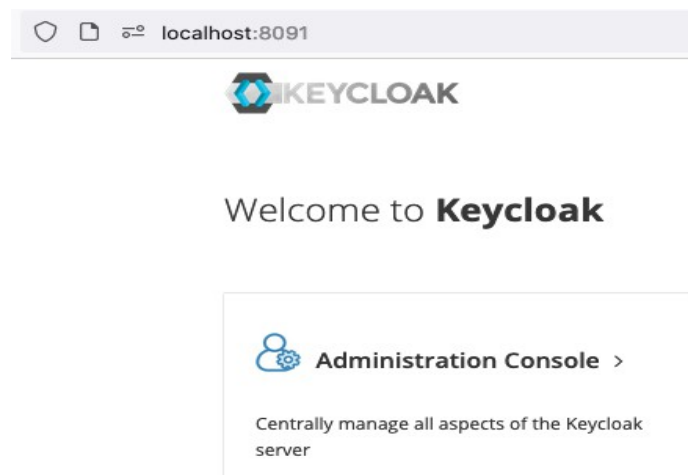
1. Download the latest keycloak server from <https://www.keycloak.org/downloads>.



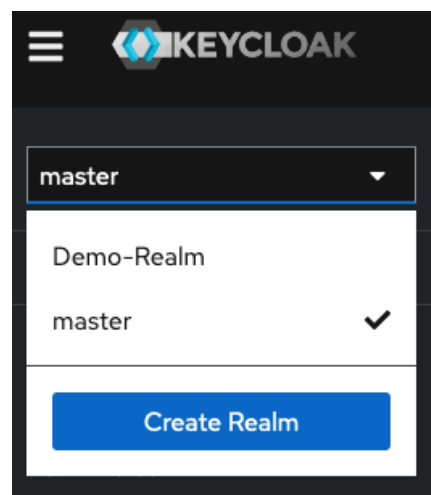
2. Unzip, open a terminal and change to directory keycloak-20.0.0 and run: `bin/kc.sh start-dev --http-port 8091`

```
keycloak-20.0.0 % bin/kc.sh start-dev --http-port 8091
```

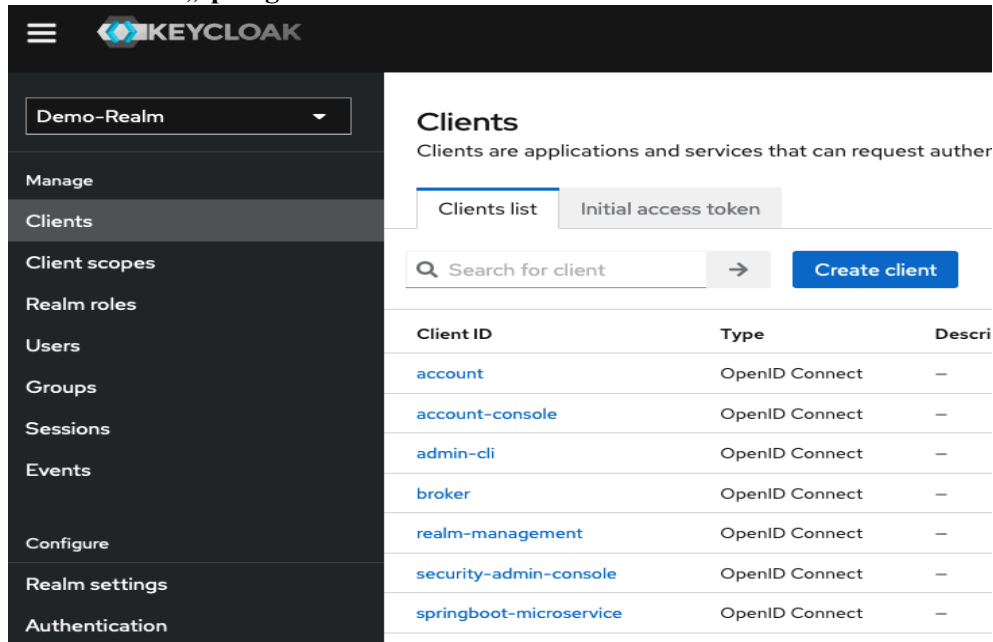
3. Open keycloak admin console



4. Have a look at <https://www.djamware.com/post/6225b66ba88c55c95abca0b6/spring-boot-security-postgresql-and-keycloak-rest-api-oauth2>
5. Create an admin account
6. Create a new Realm **Demo-Realm** and select it



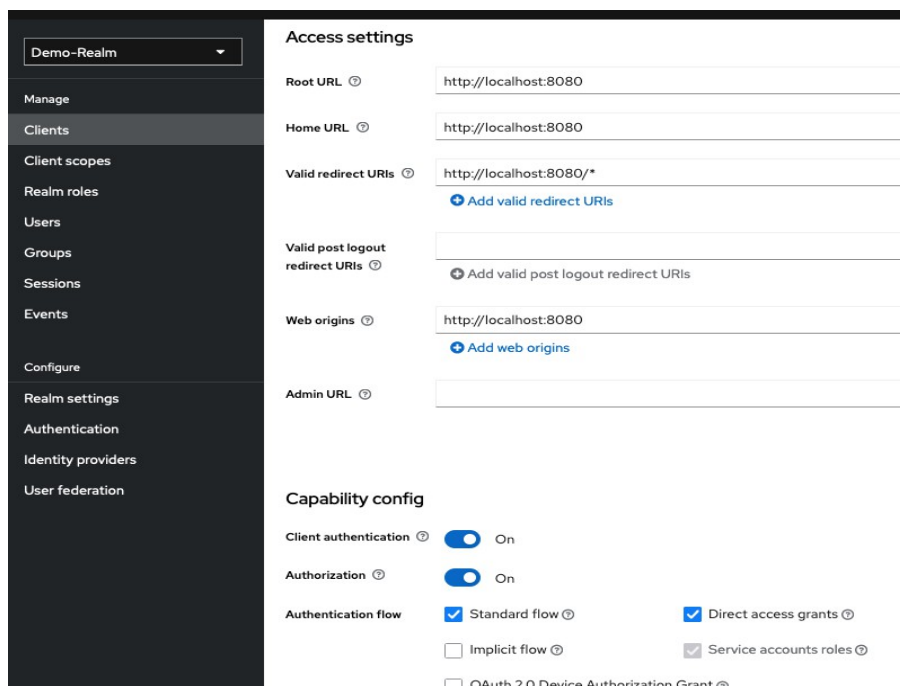
7. Create a new client „springboot-microservice“



The screenshot shows the Keycloak 'Clients' page for the 'Demo-Realm'. The left sidebar contains navigation links: Manage, Clients (selected), Client scopes, Realm roles, Users, Groups, Sessions, Events, Configure, Realm settings, and Authentication. The main content area is titled 'Clients' and includes a description: 'Clients are applications and services that can request authentication'. There are two tabs: 'Clients list' (active) and 'Initial access token'. A search bar and a 'Create client' button are present. Below is a table of existing clients.

Client ID	Type	Description
account	OpenID Connect	—
account-console	OpenID Connect	—
admin-cli	OpenID Connect	—
broker	OpenID Connect	—
realm-management	OpenID Connect	—
security-admin-console	OpenID Connect	—
springboot-microservice	OpenID Connect	—

8. Fill in Root-Url, Home-Url, Valid-Redirect-Urls and Web-Origins and switch on „Client authentication“ and „Authorization“



The screenshot shows the 'Access settings' page for the 'springboot-microservice' client in the 'Demo-Realm'. The left sidebar is the same as in the previous screenshot. The main content area has two sections: 'Access settings' and 'Capability config'.

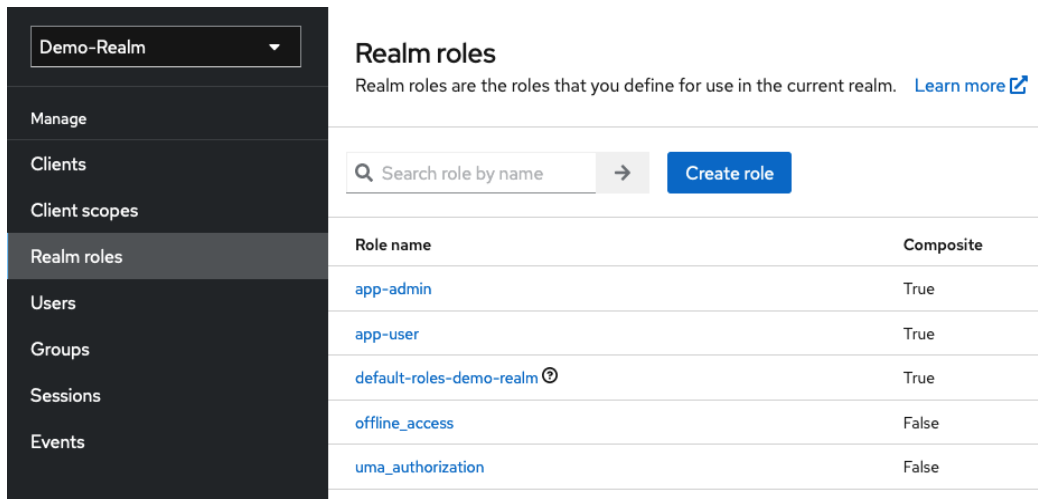
Access settings

- Root URL:
- Home URL:
- Valid redirect URIs: [Add valid redirect URIs](#)
- Valid post logout redirect URIs: [Add valid post logout redirect URIs](#)
- Web origins: [Add web origins](#)
- Admin URL:

Capability config

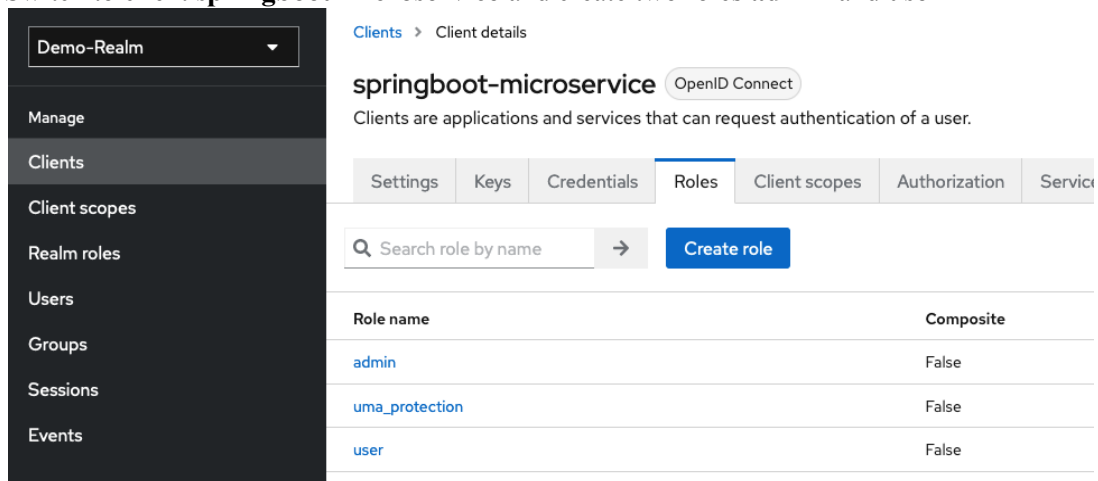
- Client authentication: ☒ On
- Authorization: ☒ On
- Authentication flow: ☒ Standard flow [Direct access grants](#) ☒ Service accounts roles ☐ OAuth 2.0 Device Authorization Grant

9. Create two Realm-Roles **app-admin** and **app-user**



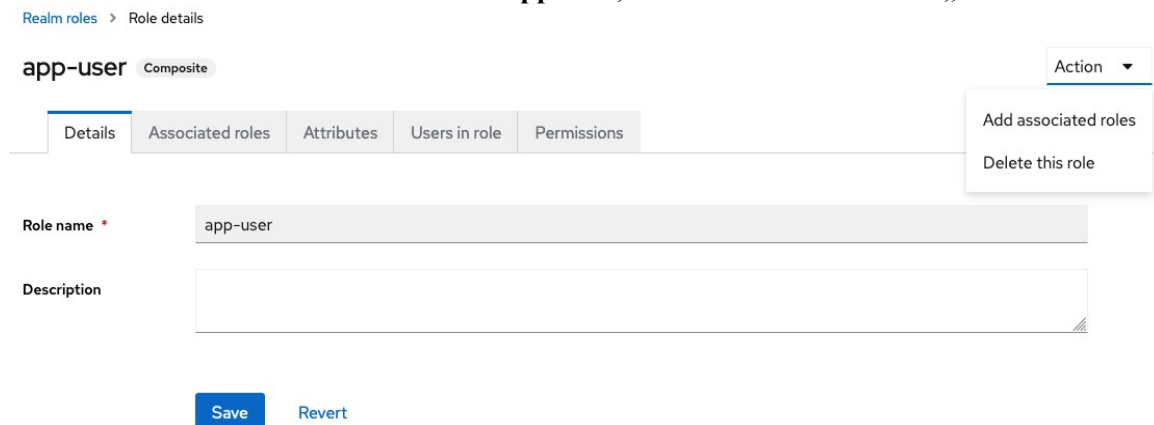
Role name	Composite
app-admin	True
app-user	True
default-roles-demo-realm ⓘ	True
offline_access	False
uma_authorization	False

10. Switch to client **springboot-microservice** and create two roles **admin** and **user**



Role name	Composite
admin	False
uma_protection	False
user	False

11. Switch to Realm-Roles and select Role **app-user**, click on Action and select „Add associated roles“



Role name *

Description

[Save](#) [Revert](#)

12. Select „filter by clients“ and enter „springboot-microservices“ and select role **user**

Assign roles to app-user account



Filter by clients

Q spring

×

→

1-3

<

>

<input type="checkbox"/>	Name	Description
<input type="checkbox"/>	springboot-microservice admin	
<input type="checkbox"/>	springboot-microservice uma_protection	
<input checked="" type="checkbox"/>	springboot-microservice user	

1-3

<

>

Assign Cancel

13. Realm-Role app-user is now a composite role

[Realm roles](#) > Role details

app-user Composite

Details

Associated roles

Attributes

Users in role

Permissions

Q Search by name

→

☒ Hide inherited roles

Assign role

Unassign

<input type="checkbox"/>	Name	Inherited	Description
<input type="checkbox"/>	springboot-microservice user	False	—

14. Do the same with Realm-Role app-admin and associate role admin

[Realm roles](#) > Role details

app-admin Composite

Details

Associated roles

Attributes

Users in role

Permissions

Q Search by name

→

☒ Hide inherited roles

Assign role

Unassign

<input type="checkbox"/>	Name	Inherited
<input type="checkbox"/>	springboot-microservice admin	False

15. Create 3 Users named employee1 – employee3, set „Email verified“ to „On“

[Users](#) > Create user

Create user


Username *	<input type="text" value="employee1"/>
Email	<input type="text" value="m0.m0@company.com"/>
Email verified ?	<input checked="" type="checkbox"/> On
First name	<input type="text" value="Max0"/>
Last name	<input type="text" value="Mustermann0"/>
Required user actions ?	<input type="text" value="Select action"/>
Groups ?	Join Groups
<div>Create Cancel</div>	

16. Set user credentials

[Users](#) > User details

employee1

Details	Attributes	Credentials	Role mapping	Groups
---------	------------	-------------	--------------	--------

?	Type	User label
⋮	Password	My password 

17. Assign Realm-Role **app-user** to employee1

employee1

Details	Attributes	Credentials	Role mapping	Groups	Consents	Identity provide
---------	------------	-------------	--------------	--------	----------	------------------

→ ☒ Hide inherited roles Assign role Unassign

<input type="checkbox"/> Name	Inherited	Description
<input type="checkbox"/> app-user	False	–
<input type="checkbox"/> default-roles-demo-realm	False	\${role_default-roles}

18. Remove all actions in field „Required user action“ and save
19. Repeat everything from point 14-17 with employee2 and assign Realm-Role app-admin

employee2

Details	Attributes	Credentials	Role mapping	Groups	Cor
---------	------------	-------------	--------------	--------	-----

→ ☒ Hide inherited roles Assign role

<input type="checkbox"/> Name	Inherited
<input type="checkbox"/> default-roles-demo-realm	False
<input type="checkbox"/> app-admin	False

20. Repeat everything from point 14-17 with employee3 and assign Realm-Role **app-admin** and **app-user**

employee3

Details	Attributes	Credentials	Role mapping	Groups	Conse
---------	------------	-------------	--------------	--------	-------

→ ☒ Hide inherited roles Assign role

<input type="checkbox"/> Name	Inherited
<input type="checkbox"/> app-user	False
<input type="checkbox"/> default-roles-demo-realm	False
<input type="checkbox"/> app-admin	False

21. Switch to client scopes and add new scope read

Client scopes

Client scopes are a common set of protocol mappers and roles that are shared between i

▼ Name

×

→

Create client scope

<input type="checkbox"/>	Name	Assigned type	Protocol
<input type="checkbox"/>	read	None	OpenID Conn

22. Assign Realm-Roles app-admin, app-user and Roles user and admin to scope read

[Client scopes](#) > Client scope details

read openid-connect

Settings

Mappers

Scope

→

☒ Hide inherited roles

Assign role

<input type="checkbox"/>	Name	Inherited
<input type="checkbox"/>	app-user	False
<input type="checkbox"/>	app-admin	False
<input type="checkbox"/>	springboot-microservice admin	False
<input type="checkbox"/>	springboot-microservice user	False

23. Switch to client „springboot-microservices“ and add scope read as „Optional“

[Clients](#) > Client details

springboot-microservice OpenID Connect

Clients are applications and services that can request authentication of a user.

Settings

Keys

Credentials

Roles

Client scopes

Authorization

Service

Setup

Evaluate

▼ Name

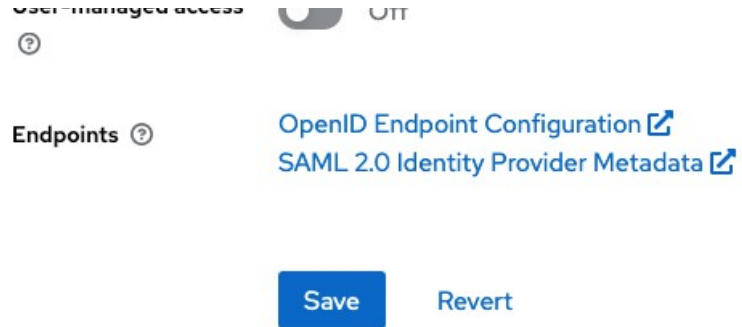
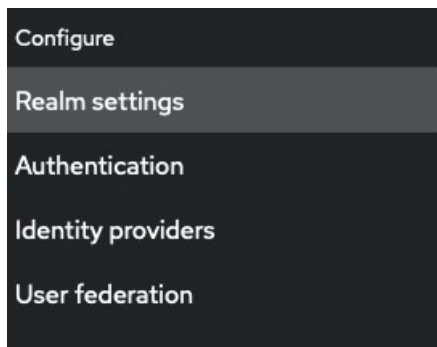
×

→

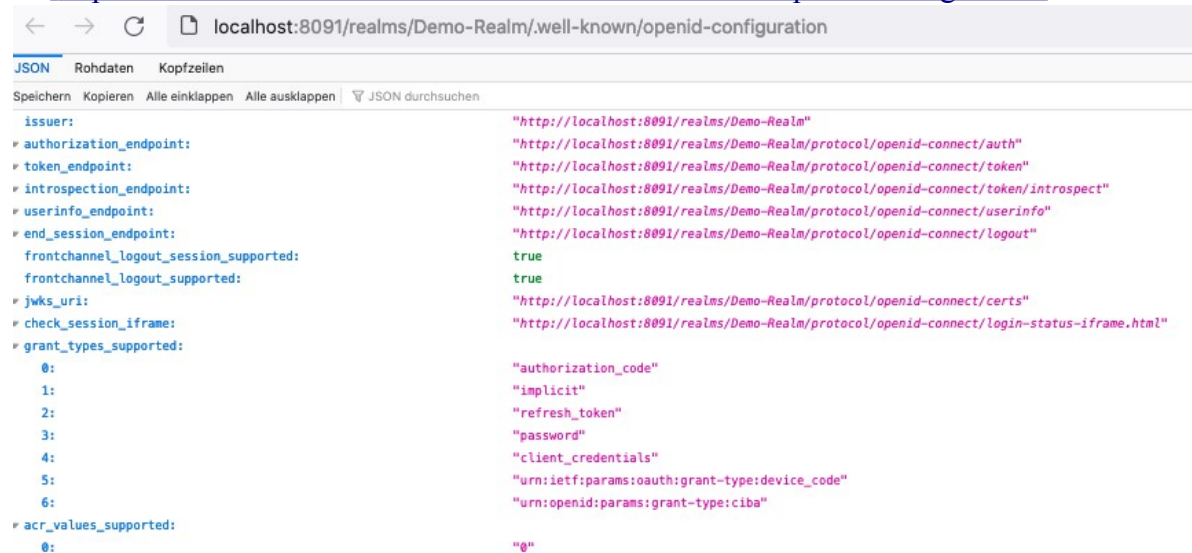
Add client scope

<input type="checkbox"/>	Assigned client scope	Assigned type	Descri
<input type="checkbox"/>	springboot-microservice-dedicated	none	Dedica
<input type="checkbox"/>	read	Optional	

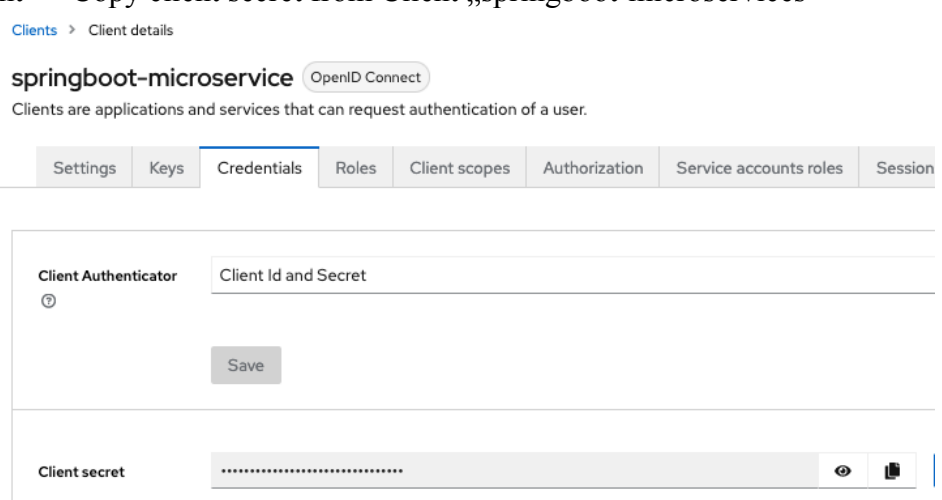
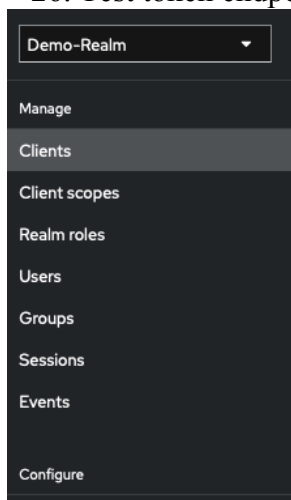
24. Switch to Realm settings an open „OpenID Endpoint Configuration“



25. <http://localhost:8091/realms/Demo-Realm/.well-known/openid-configuration>



26. Test token endpoint → Copy client secret from Client „springboot-microservices“



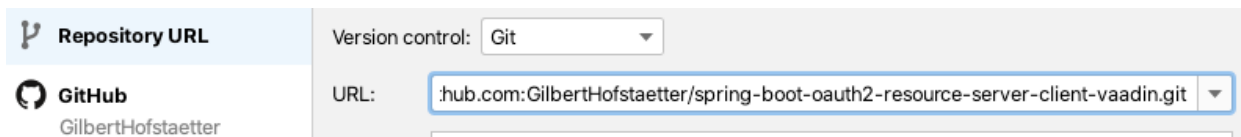
27. Use Postman or a REST client of your choice to receive an access token

29. Open <https://jwt.io/> to decode our access token
30. See section resource-access for our applied user role

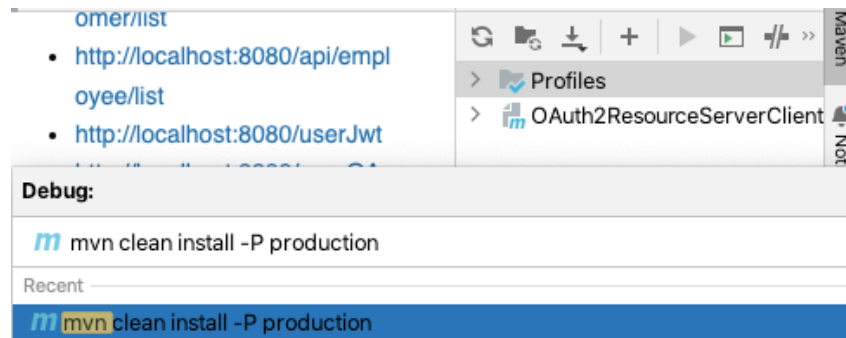
```
    "realm_access": {
      "roles": [
        "offline_access",
        "default-roles-demo-realm",
        "uma_authorization",
        "app-user"
      ]
    },
    "resource_access": {
      "springboot-microservice": {
        "roles": [
          "user"
        ]
      }
    },
    "account": {
```

2 Setup Spring boot project

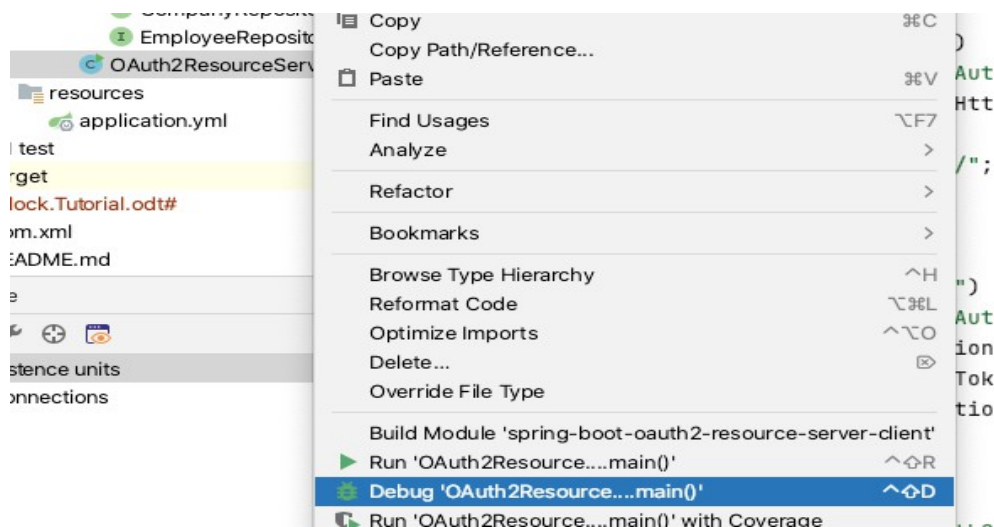
- Clone from [git@github.com:GilbertHofstaetter/spring-boot-oauth2-resource-server-client-vaadin.git](https://github.com/GilbertHofstaetter/spring-boot-oauth2-resource-server-client-vaadin.git)



- mvn clean install -P production

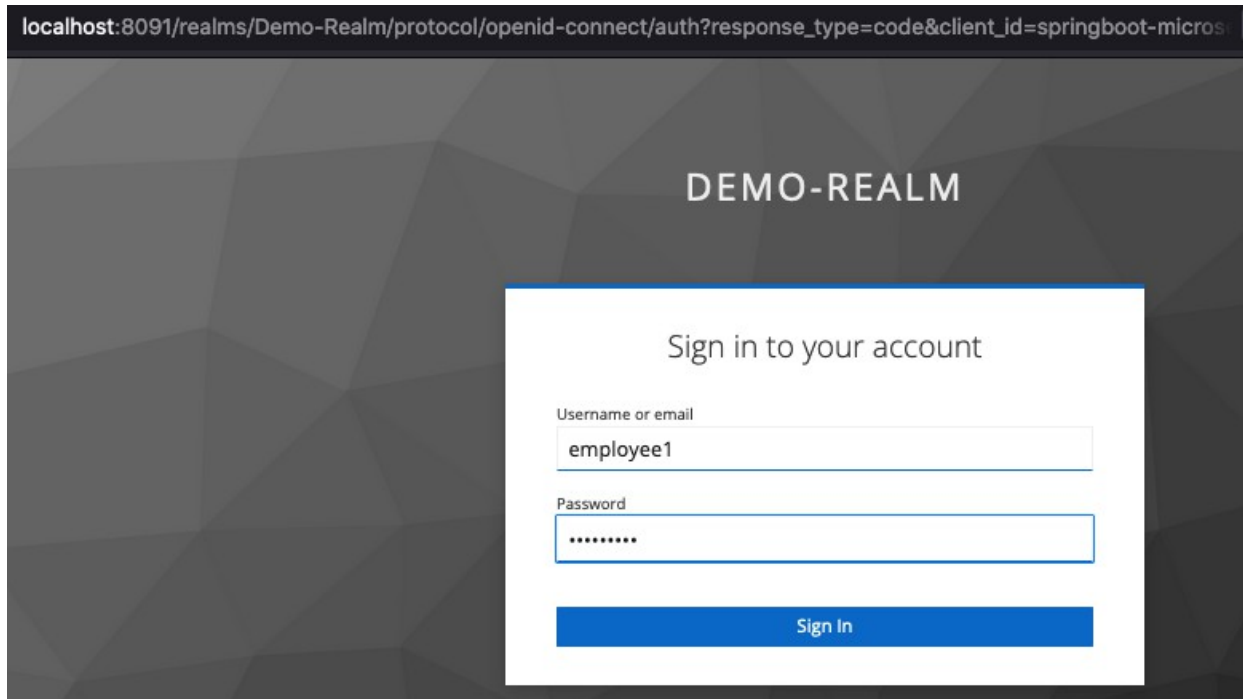


- Start project

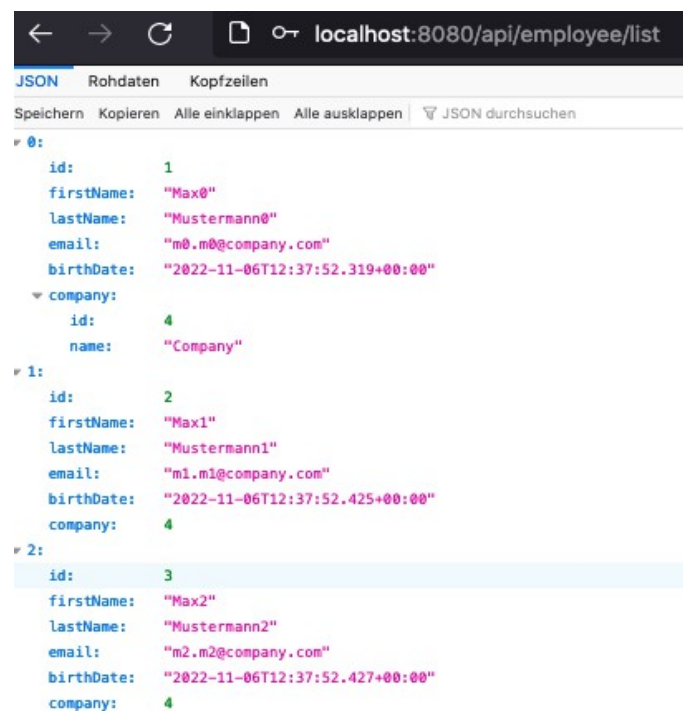


3 Test oauth2 login

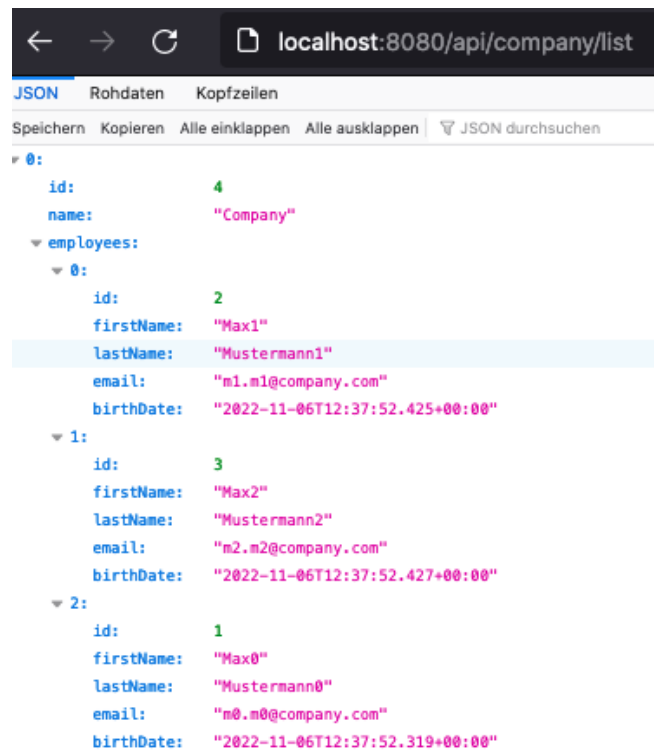
- Open <http://localhost:8080/api/employee/list> in your browser



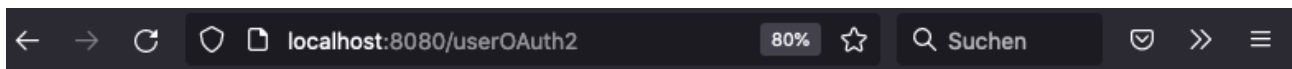
- Enter login infos for user employee1 → Data gets listed → Role user is applied



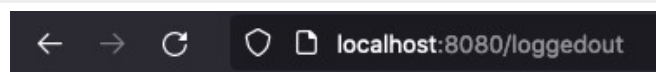
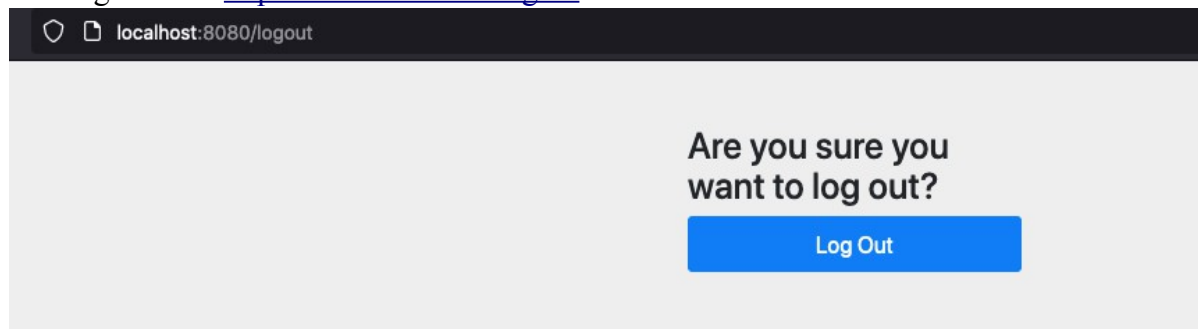
- Open <http://localhost:8080/api/company/list> → already authenticated



- Try to open <http://localhost:8080/userOAuth2> → a blank page appears and status 403 is reported → endpoint `./userOAuth2` needs admin role to perform → logout and sign in as user employee2 or employee3

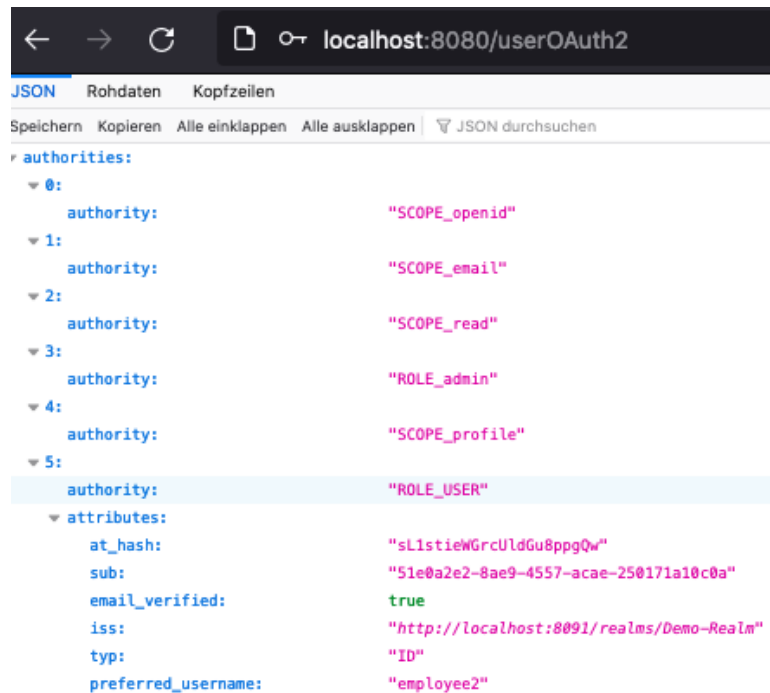


- Logout with <http://localhost:8080/logout>



Logged out

- Open again <http://localhost:8080/userOAuth2> → login with user employee2 or employee3



4 Test JWT access

- Access <http://localhost:8080/api/employee/list> via REST client
- Retrieve an access token as employee3 (don't forget to request optional **scope read**)

[illegible]

- Call <http://localhost:8080/api/employee/list> with Authorisation-Header Bearer *your access token *

GET
http://localhost:8080/api/employee/list
Send request

Headers
Authorization
b_UzmUbsK4EFQXcqASKJbsQ0vkJNSFfaL-bQtLAKXscu0XGnhpA
+ Add header
Basic auth

Response (0.104s) - http://localhost:8080/api/employee/list

200

Headers
[
{
"id": 1,
"firstName": "Max0",
"lastName": "Mustermann0",
"email": "m0.m0@company.com",
"birthDate": "2022-11-06T12:37:52.319+00:00",
"company": {
"id": 4,
"name": "Company"
}
},
{
"id": 2,
"firstName": "Max1",
"lastName": "Mustermann1",
"email": "m1.m1@company.com",
"birthDate": "2022-11-06T12:37:52.425+00:00",
"company": 4
},
{
"id": 3,
"firstName": "Max2",
"lastName": "Mustermann2",
"email": "m2.m2@company.com",
"birthDate": "2022-11-06T12:37:52.427+00:00",
"company": 4
}
]

- Call <http://localhost:8080/api/company/list>

GET
http://localhost:8080/api/company/list
Send request

Headers
Authorization
b_UzmUbsK4EFQXcqASKJbsQ0vkJNSFfaL-bQtLAKXscu0XGnhpA
+ Add header
Basic auth

Response (0.035s) - http://localhost:8080/api/company/list

200

Headers
[
{
"id": 4,
"name": "Company",
"employees": [
{
"id": 2,
"firstName": "Max1",
"lastName": "Mustermann1",
"email": "m1.m1@company.com",
"birthDate": "2022-11-06T12:37:52.425+00:00"
},
{
"id": 3,
"firstName": "Max2",
"lastName": "Mustermann2",
"email": "m2.m2@company.com",
"birthDate": "2022-11-06T12:37:52.427+00:00"
},
{
"id": 1,
"firstName": "Max0",
"lastName": "Mustermann0",
"email": "m0.m0@company.com",
"birthDate": "2022-11-06T12:37:52.319+00:00"
}
]
}
]

- Call <http://localhost:8080/userJwt>

[illegible]

5 Springdoc/Openapi

- Open <http://localhost:8080/swagger-ui.html> in a Browser
- Login as employee2 (admin Role)

Sign in to your account

Username or email

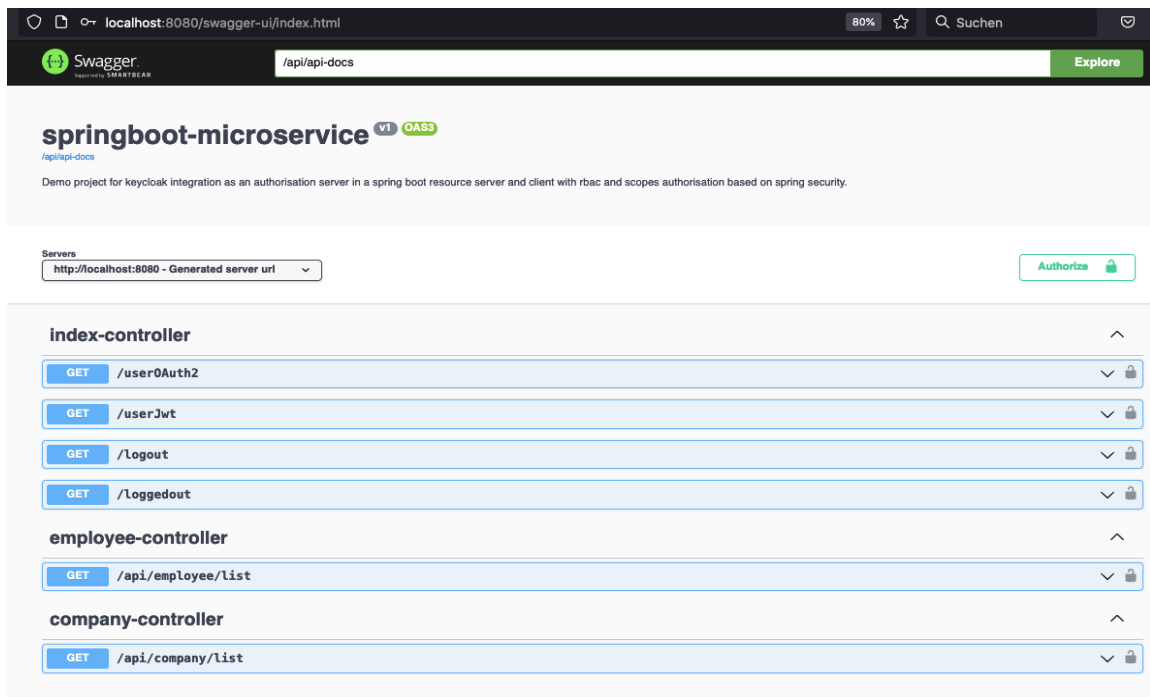
employee2

Password

.....|

Sign In

- Swagger-ui opens



- Click „Authorize“
- Fill in employee3 as user, userpassword, client-id (springboot-microservice), client secret and select scope „read“
 - Password Flow is used

Available authorizations

keycloak (OAuth2, password)

Token URL: http://localhost:8091/realms/Demo-Realm/protocol/openid-connect/token

Flow: password

username:
employee3

password:
.....

Client credentials location:
Authorization header

client_id:
springboot-microservice

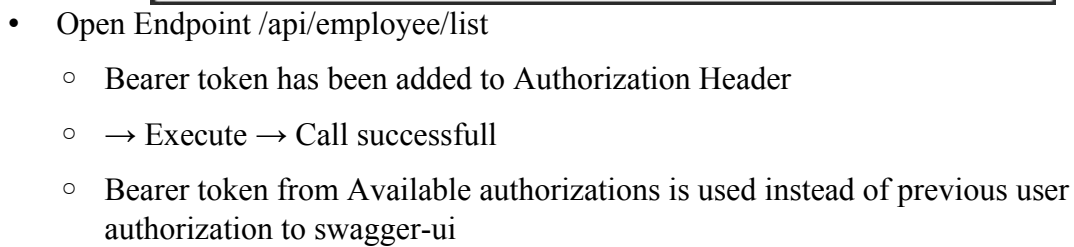
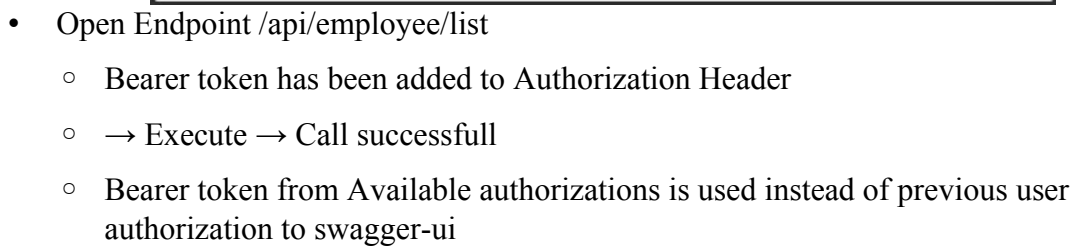
client_secret:
.....

Scopes: [select all](#) [select none](#)

☒ read
read

Authorize

Close



6 Vaadin front end

- Call <http://localhost:8080/ui>
- Keycloak login opens

localhost:8091/realms/Demo-Realm/protocol/openid-connect/auth?response_type=code&client_id=springboot

DEMO-REALM

Sign in to your account

Username or email

Password

Sign In

- Enter User and password
- Redirect to <http://localhost:8080/ui>

localhost:8080/ui/

Home

Logout

- Test
- Swagger-ui
- Employee
- Company

- Open Employee

localhost:8080/ui/employee

Employee

Logout

Filter by last name

Id	First Name	Last Name	Email	Birth Date
1	Max0	Mustermann0	m0.m0@company.com	2022-11-08 09:38:14.345
2	Max1	Mustermann1	m1.m1@company.com	2022-11-08 09:38:14.522
3	Max2	Mustermann2	m2.m2@company.com	2022-11-08 09:38:14.526

- Open Company

