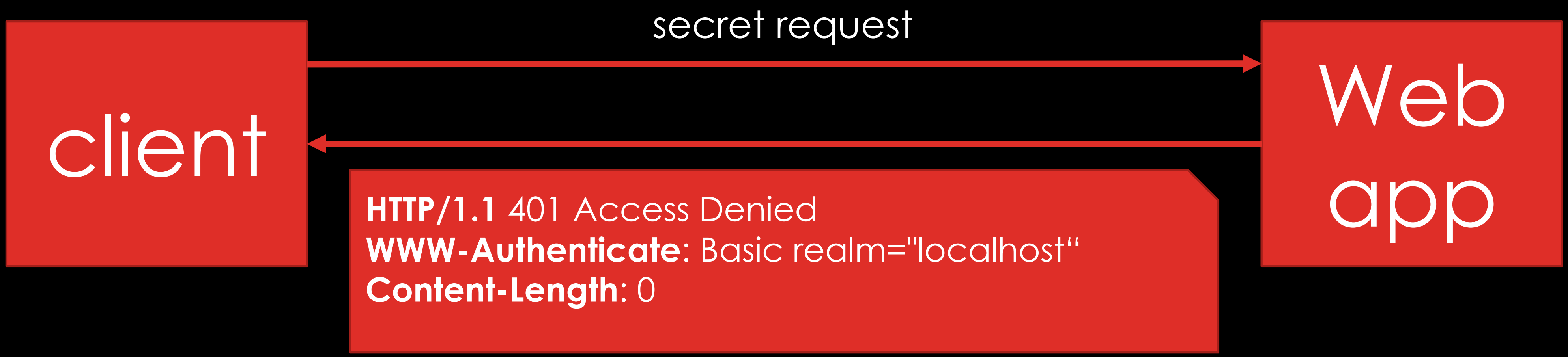
SLIDES AND CODE

- https://gitlab.com/JHelm/oauth2-demo
- Tutorial: https://gitlab.com/JHelm/oauth2-demo/tree/master/tutorial

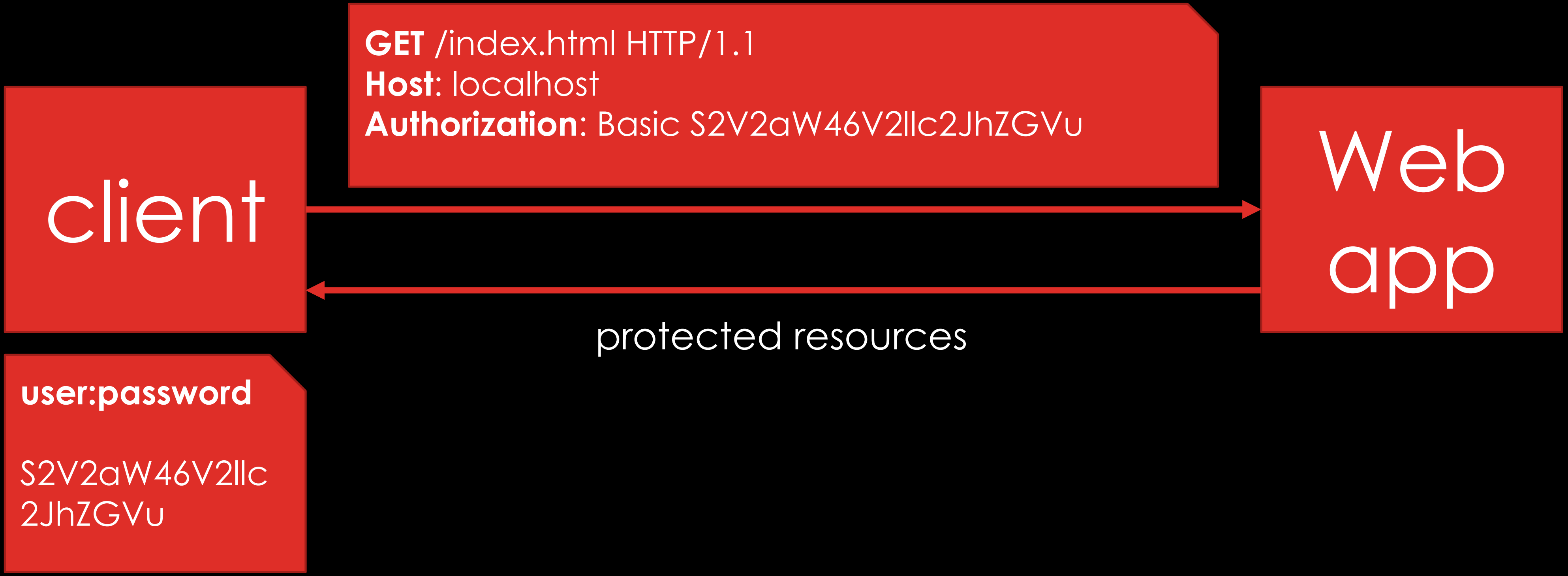
BASIC AUTHENTICATION

- HTTP is stateless: for **each** request you have to send your credentials (username and password)



```
HTTP/1.1 401 Access Denied
WWW-Authenticate: Basic realm="localhost“
Content-Length: 0
```

BASIC AUTHENTICATION

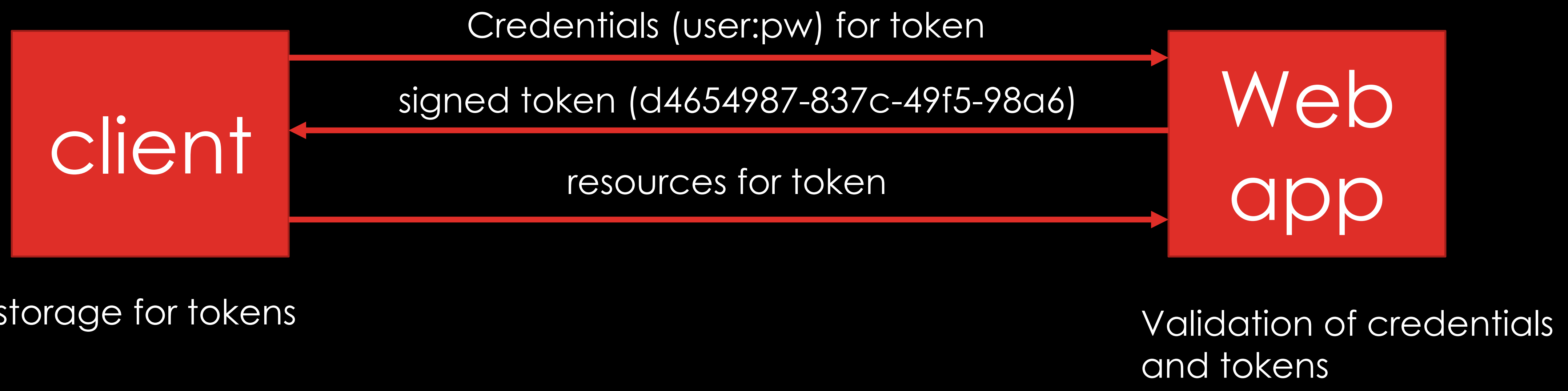


GET /index.html HTTP/1.1
Host: localhost
Authorization: Basic S2V2aW46V2llc2JhZGVu

user:password

S2V2aW46V2llc
2JhZGVu

TOKEN BASED AUTHENTICATION


Credentials (user:pw) for token
client
signed token (d4654987-837c-49f5-98a6)
Web app
resources for token
storage for tokens
Validation of credentials and tokens

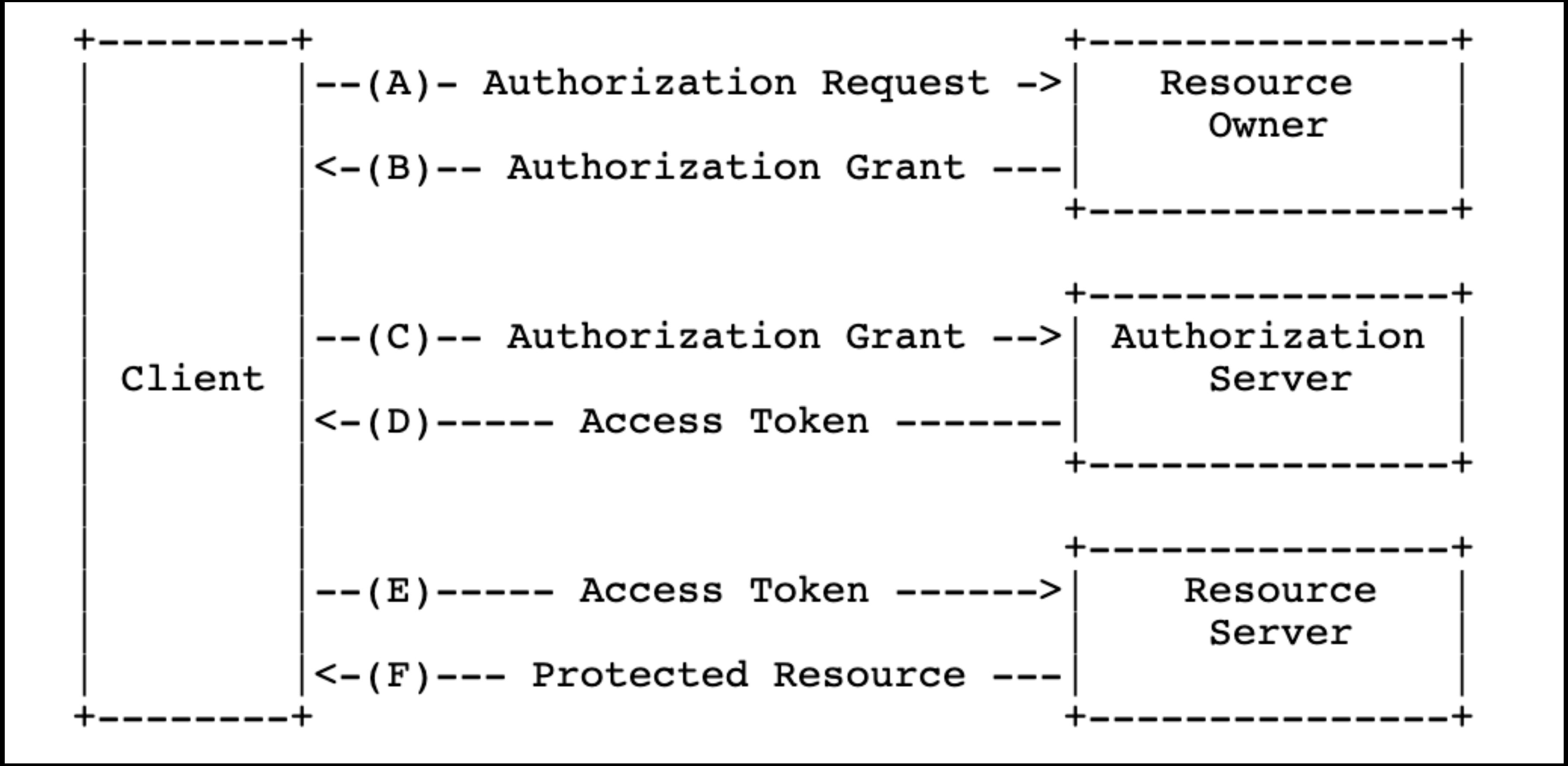
THE OAUTH 2.0 AUTHORIZATION FRAMEWORK

https://tools.ietf.org/html/rfc6749#section-1.3.3

TERMINOLOGY

resource owner	• user • restricts the scope of the data
client	• application that wants to access protected resources on behalf of a user • can only access data that is absolutely necessary (restricted by user)
resource server	• management of protected resources • only the user is allowed to access his data
authorization server	• authorizes the access of an user after its valid authentication
access token	• temporary valid • used by resource-server to access the user data and check its rights
refresh token	• used to get a new access-token

PROTOCOL FLOW



```
+--------+                               +---------------+
|        |--(A)- Authorization Request ->|   Resource    |
|        |                               |     Owner     |
|        |<-(B)-- Authorization Grant ---|               |
|        |                               +---------------+
|        |
|        |                               +---------------+
|        |--(C)-- Authorization Grant -->| Authorization |
| Client |                               |     Server    |
|        |<-(D)----- Access Token -------|               |
|        |                               +---------------+
|        |
|        |                               +---------------+
|        |--(E)----- Access Token ------>|    Resource   |
|        |                               |     Server    |
|        |<-(F)--- Protected Resource ---|               |
+--------+                               +---------------+
```

https://tools.ietf.org/html/rfc6749, page 6, access: 14.10.2019 12:09

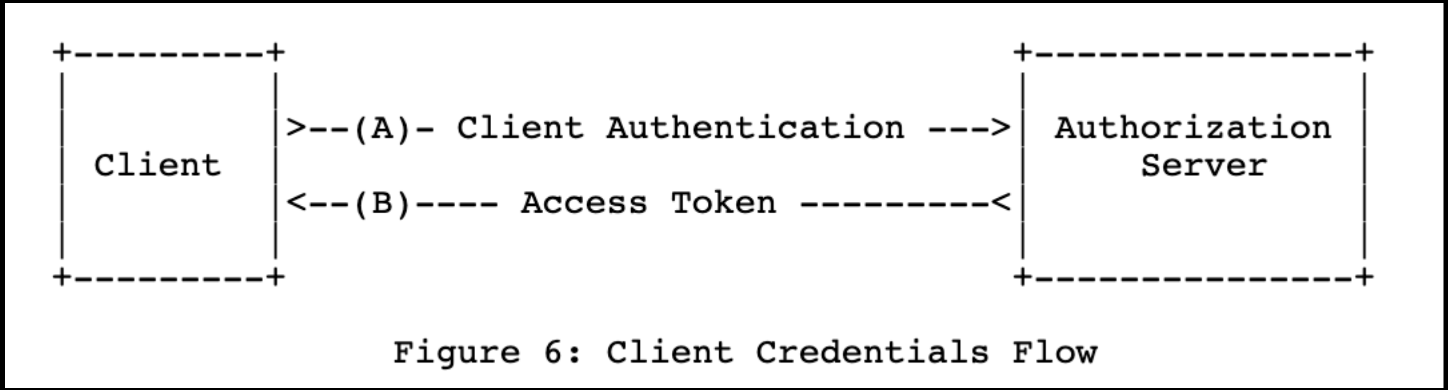
JSON WEB TOKEN (JWT)

- JSON object defined as a secure way to exchange information between two parties according to RFC 7519
- consists of a sequence of header, payload and signature
  `Header.Payload.Signatur`
- content of token is encoded and signed but not encrypted
- https://jwt.io

AUTHORIZATION GRANT

- credential, that represents the clients/ressource owners authorization
    - **client credentials**
    - **authorization code**
    - **resource owner password credentials**
    - implicit

CLIENT CREDENTIALS



```
+---------+                                  +---------------+
|         |                                  |               |
|         |>--(A)- Client Authentication --->| Authorization |
| Client  |                                  |    Server     |
|         |<--(B)---- Access Token ---------<|               |
|         |                                  |               |
+---------+                                  +---------------+
```

Figure 6: Client Credentials Flow

(a) authentication with the authorization server and request access token from token endpoint
(b) authorization server authenticates client and issues an access token

CLIENT CREDENTIALS

```
curl --request POST
--url http://localhost:8080/oauth/token
--header 'authorization: Basic d2ViOnNlY3JldA=='
--header 'content-type: application/x-www-form-urlencoded'
--data grant_type=client_credentials
```

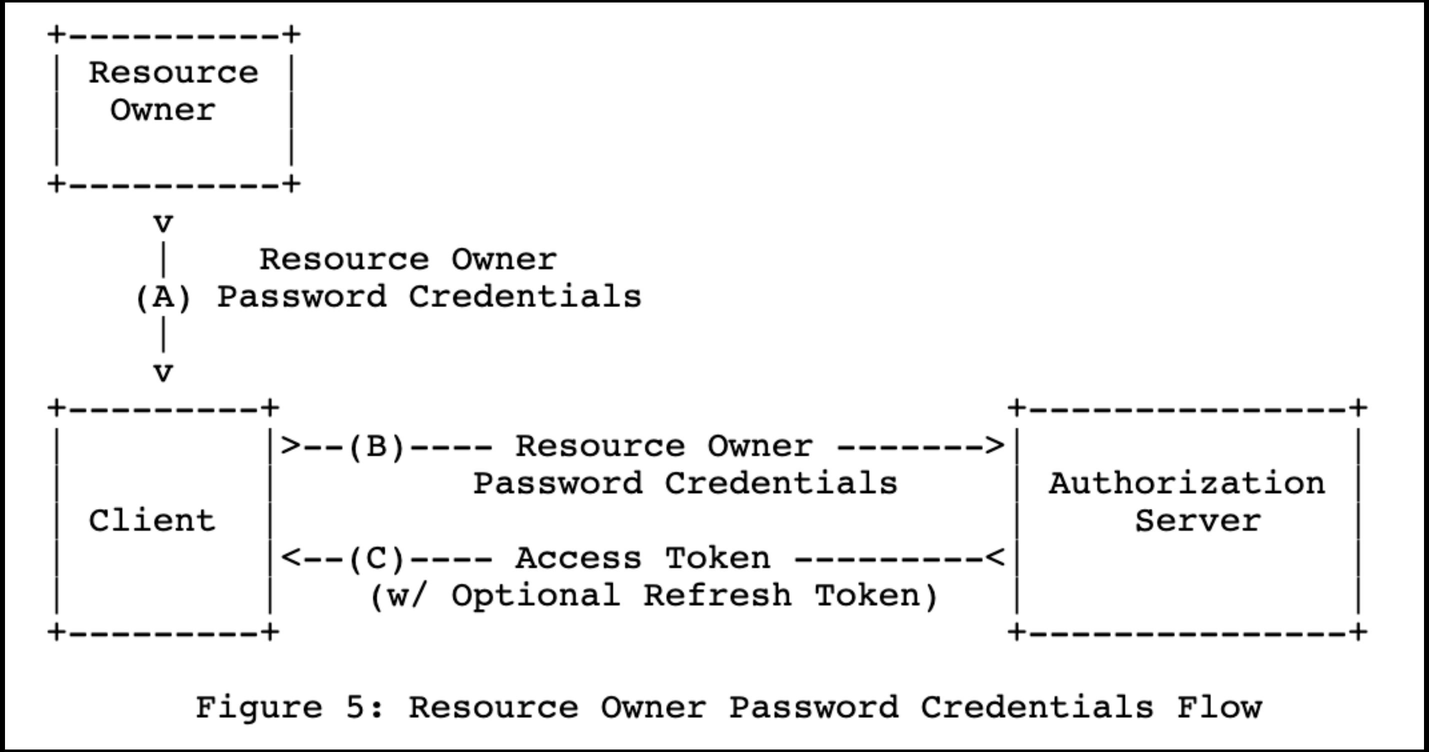
RESPONSE:

```
{
"access_token": "16cac3a3-1e0e-452a-bbd3-36478eb7d96a",
"token_type":     "bearer",
"expires_in":        59,
"scope":               "read write"
}
```

DEMO

Client Credentials

RESOURCE OWNER PASSWORD CREDENTIALS GRANT



```
     +----------+
     | Resource |
     |  Owner   |
     |          |
     +----------+
          v
          |    Resource Owner
         (A) Password Credentials
          |
          v
     +---------+                                  +---------------+
     |         |>--(B)---- Resource Owner ------->|               |
     |         |         Password Credentials     | Authorization |
     | Client  |                                  |     Server    |
     |         |<--(C)---- Access Token ---------<|               |
     |         |    (w/ Optional Refresh Token)   |               |
     +---------+                                  +---------------+

            Figure 5: Resource Owner Password Credentials Flow
```

RESOURCE OWNER PASSWORD CREDENTIALS

```
curl --request POST
--url http://localhost:8080/oauth/token
--header 'authorization: Basic d2ViOnNlY3JldA==''
--header 'content-type: multipart/form-data; boundary=---011000010111000001101001'
--form username=maxmuster
--form grant_type=password
--form password=secret
```

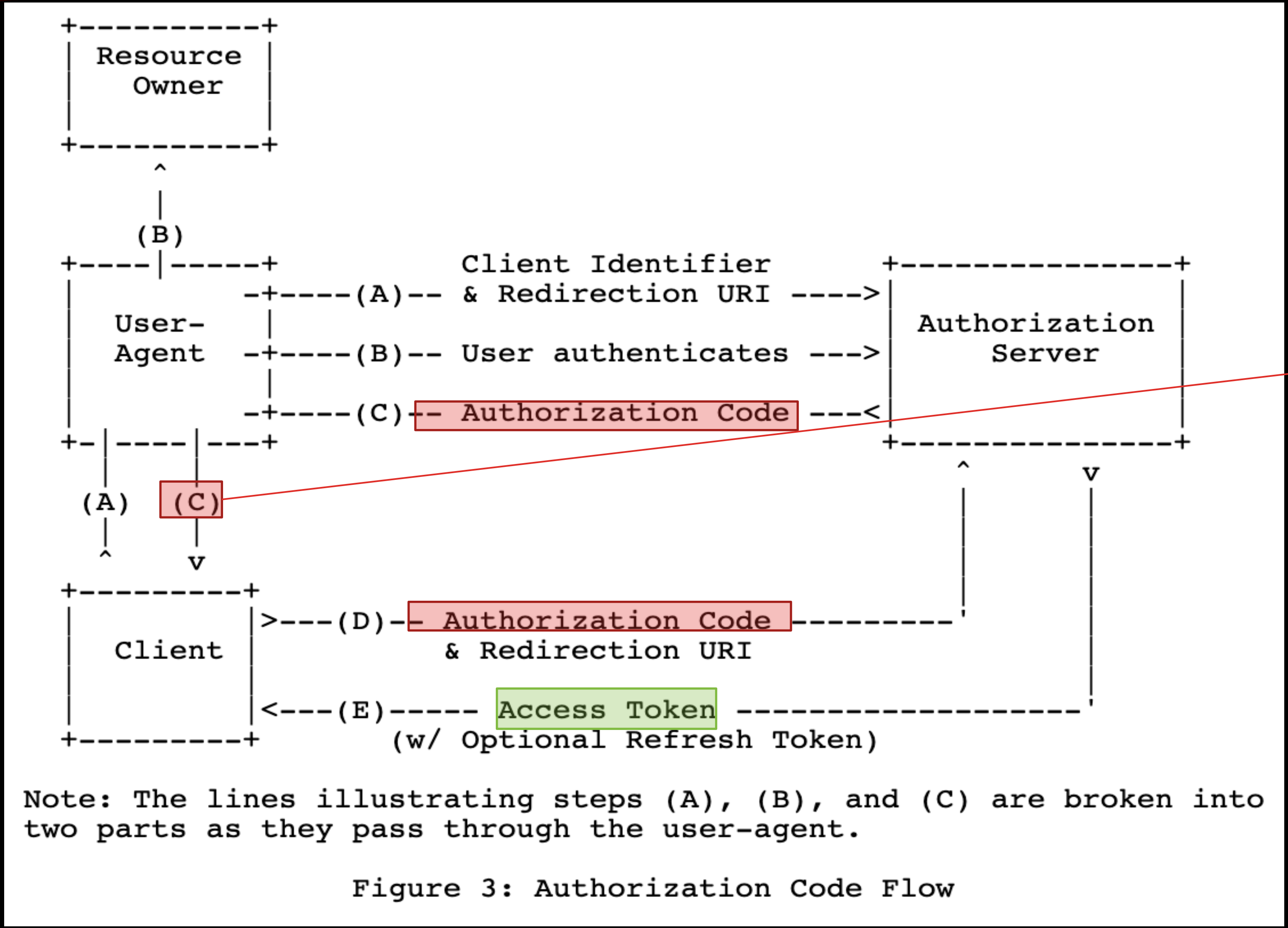
RESPONSE:

```
{
"access_token": "08d5565f-f7db-4b26-9e76-6d59b3c7d6a6",
"token_type":      "bearer",
"refresh_token": "8638e3c3-93e2-4e88-a1fe-3c880857f918",
"expires_in":       59,
"scope":              "read write"
}
```

DEMO

Resource Owner Password Credentials

AUTHORIZATION CODE GRANT



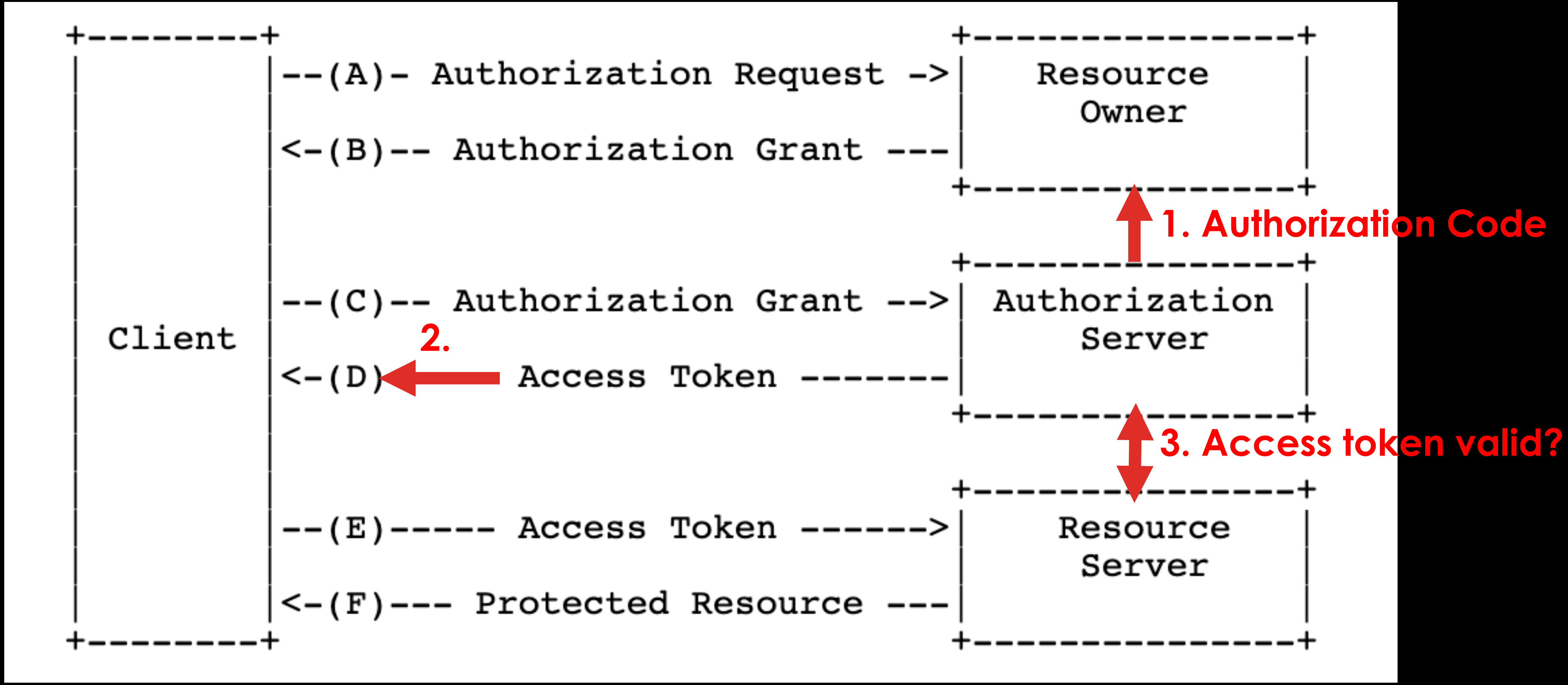
```
+----------+
| Resource |
|  Owner   |
|          |
+----------+
     ^
     |
    (B)
+----|-----+          Client Identifier      +---------------+
|         -+----(A)-- & Redirection URI ---->|               |
|  User-   |                                 | Authorization |
|  Agent  -+----(B)-- User authenticates --->|     Server    |
|          |                                 |               |
|         -+----(C)-- Authorization Code ---<|               |
+-|----|---+                                 +---------------+
  |    |                                         ^      v
 (A)  (C)                                        |      |
  |    |                                         |      |
  ^    v                                         |      |
+---------+                                      |      |
|         |>---(D)-- Authorization Code ---------'      |
|  Client |          & Redirection URI                  |
|         |                                             |
|         |<---(E)----- Access Token -------------------'
+---------+       (w/ Optional Refresh Token)

Note: The lines illustrating steps (A), (B), and (C) are broken into
two parts as they pass through the user-agent.

                Figure 3: Authorization Code Flow
```

http://localhost:8080/login?**code=b087c5d6a9993ddebd64**

AUTHORIZATION CODE



```
+--------+                               +---------------+
|        |--(A)- Authorization Request ->|   Resource    |
|        |                               |     Owner     |
|        |<-(B)-- Authorization Grant ---|               |
|        |                               +---------------+
|        |
|        |                               +---------------+
|        |--(C)-- Authorization Grant -->| Authorization |
| Client |                               |     Server    |
|        |<-(D)----- Access Token -------|               |
|        |                               +---------------+
|        |
|        |                               +---------------+
|        |--(E)----- Access Token ------>|    Resource   |
|        |                               |     Server    |
|        |<-(F)--- Protected Resource ---|               |
+--------+                               +---------------+
```

https://tools.ietf.org/html/rfc6749, page 6, access: 14.10.2019 12:09

DEMO

Authorization Code

TUTORIAL

https://gitlab.com/JHelm/oauth2-demo/tree/master/tutorial

SOURCES

- https://tools.ietf.org/html/rfc6749
- Entwickler Magazin Spezial Volume 16 “Security – Sichere IT-Systeme bauen“, Software & Support Media GmbH, 2018