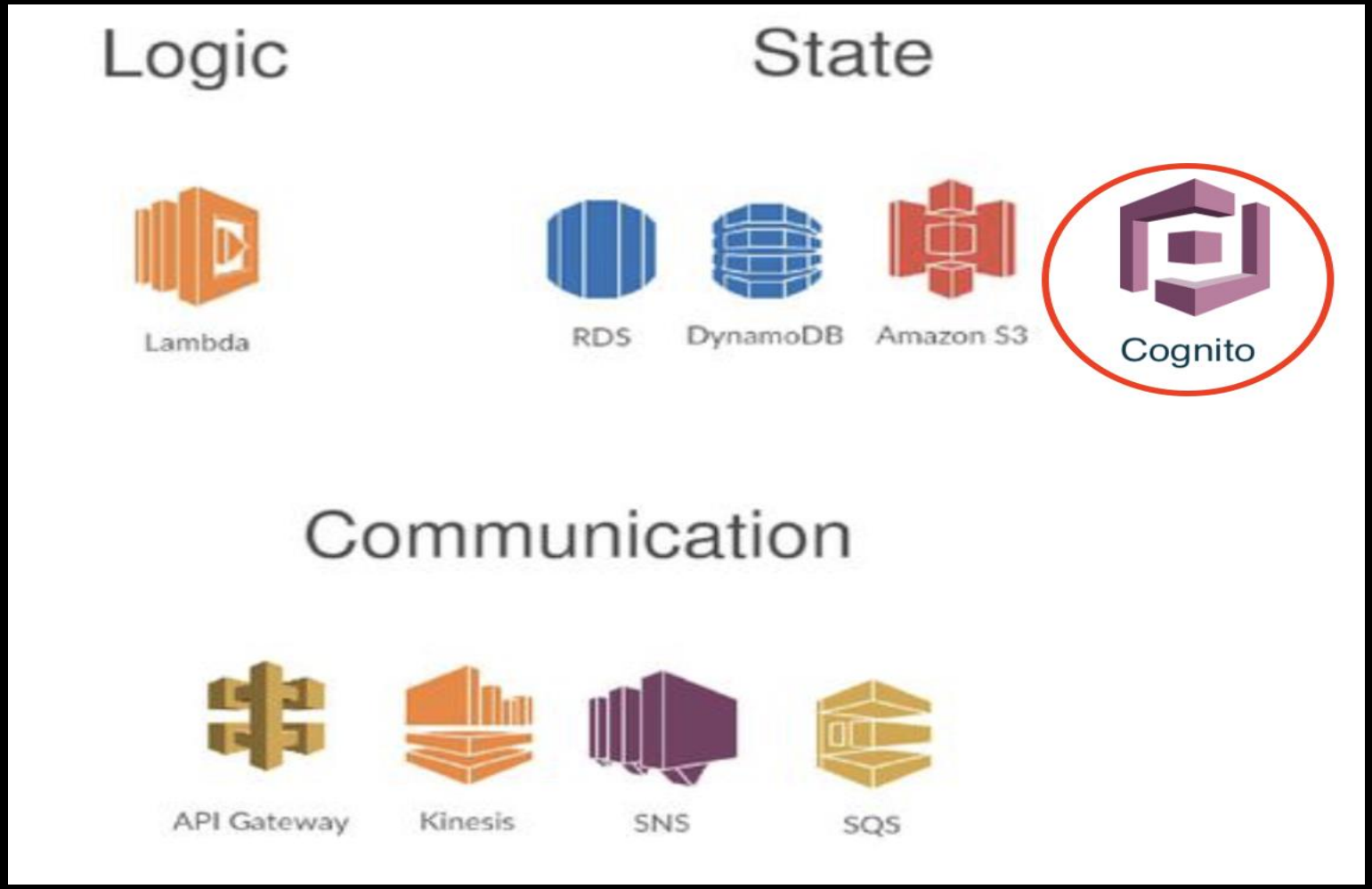
Amazon Cognito

Components of a Serverless app



Amazon Cognito

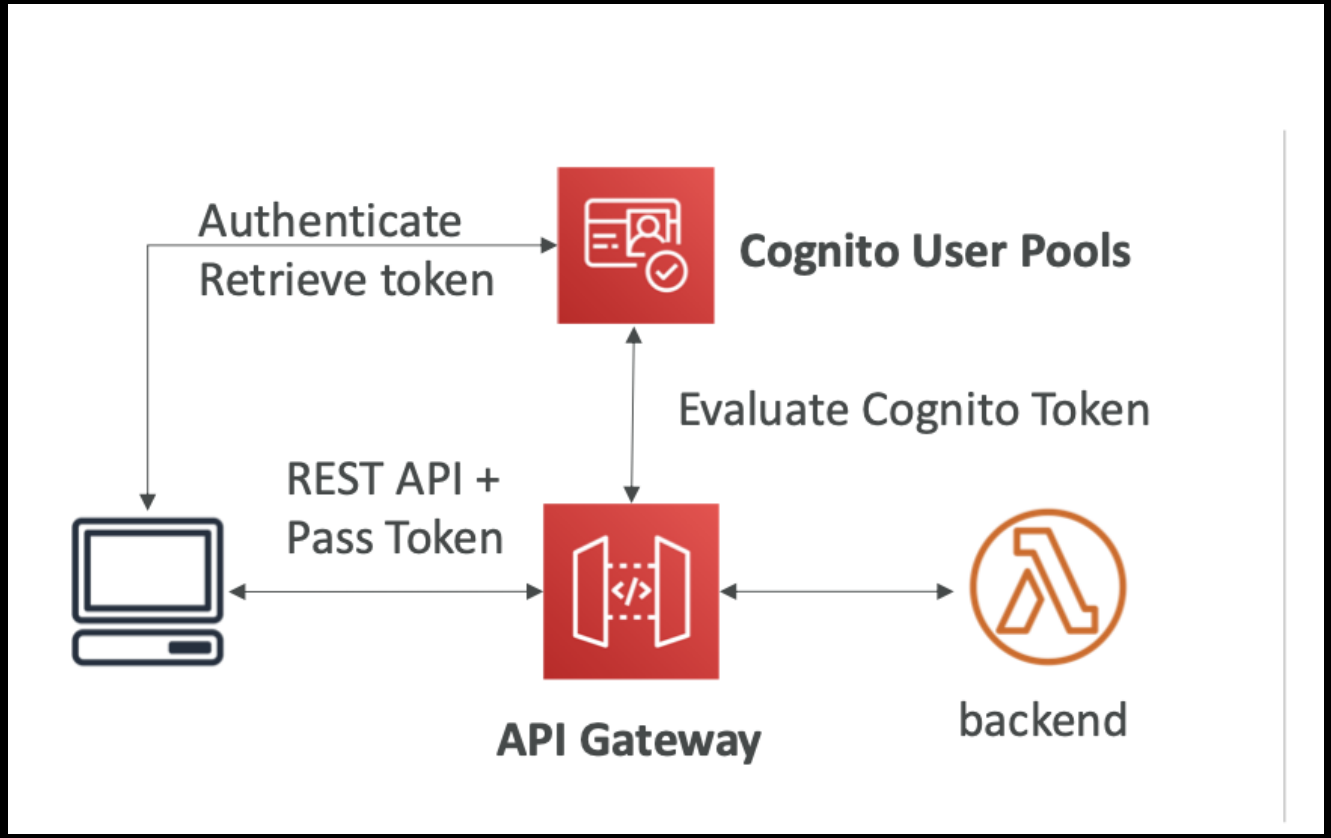
- We want to give users an identity so that they can interact with our application.
- Cognito User Pools:
  - Sign in functionality for app users.
  - Integrate with API Gateway & Application Load Balancer.
- Cognito Identity Pools (Federated Identity):
  - Provide AWS credentials to users so they can access AWS resources directly.
  - Integrate with Cognito User Pools as an identity provider.

- Cognito vs IAM: “hundreds of users”, ”mobile users”.

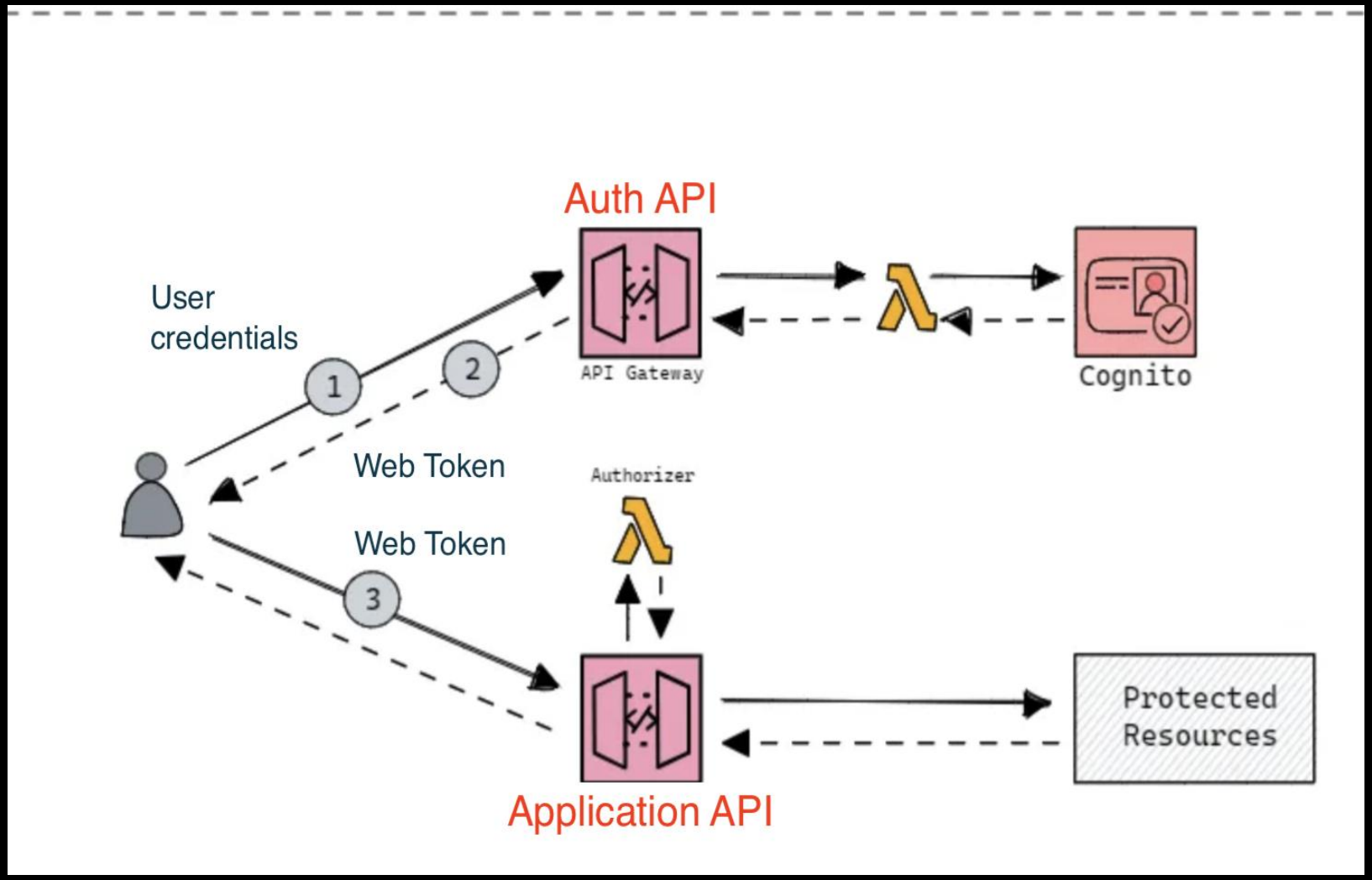
Cognito User Pool.

- Creates a serverless database of user for your web & mobile apps.
- Simple login: Username (or email) / password combination.
- Password reset.
- Email & Phone Number Verification.
- Multi-factor authentication (MFA).
- Federated Identities: Facebook, Google...
- Feature: block users if their credentials are compromised elsewhere
- Include JSON Web Token (JWT) in Login response.

Cognito's role

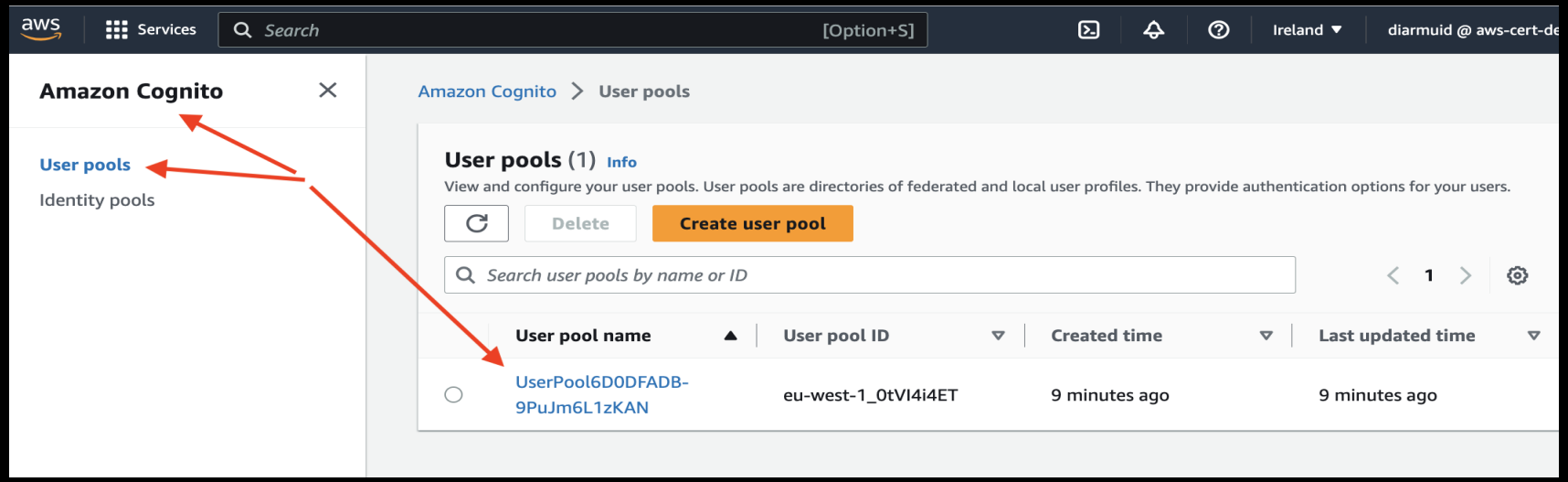


Typical architecture



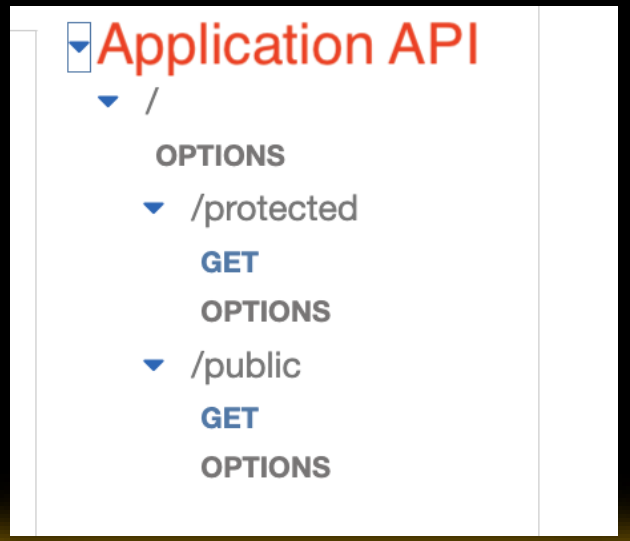
```
110  // CDK setup
111  const userPool = new UserPool(this, 'UserPool', {
112    signInAliases: { username: true, email: true },
113    selfSignUpEnabled: true,
114    removalPolicy: RemovalPolicy.DESTROY,
115  });
116
117  const appClient = userPool.addClient('AppClient', {
118    authFlows: { userPassword: true },
119  });
120
```

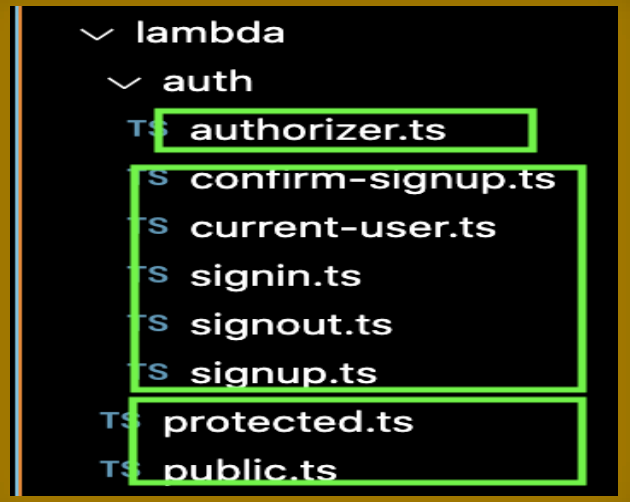
Demo – User pool



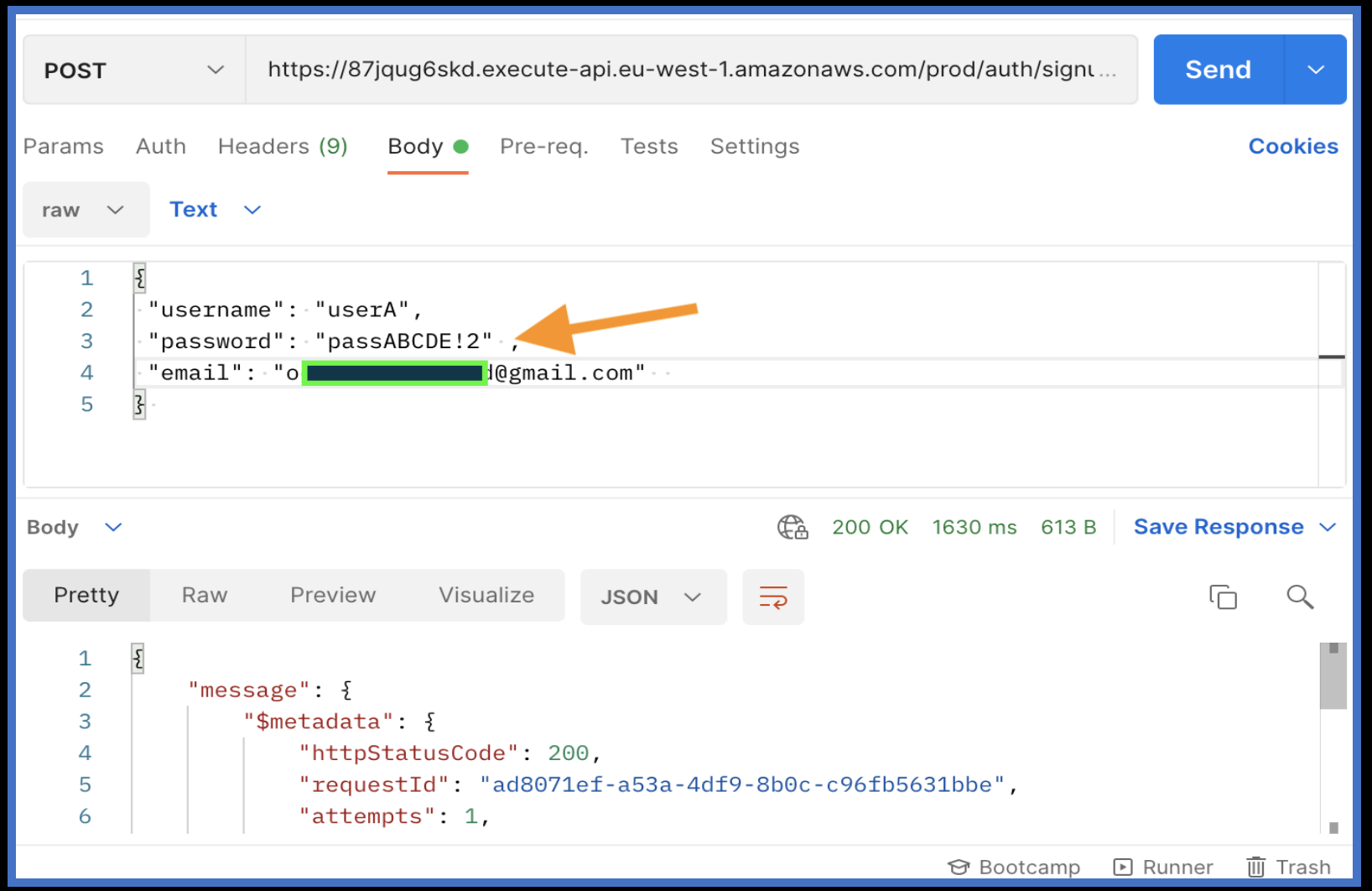
Demo – APIs.


Auth API
/
OPTIONS
/auth
OPTIONS
/auth/confirm_signup
OPTIONS
POST
/auth/current_user
GET
OPTIONS
/auth/signin
OPTIONS
POST
/auth/signout
GET
OPTIONS
/auth/signup
OPTIONS
POST


Application API
/
OPTIONS
/protected
GET
OPTIONS
/public
GET
OPTIONS


lambda
auth
authorizer.ts
confirm-signup.ts
current-user.ts
signin.ts
signout.ts
signup.ts
protected.ts
public.ts

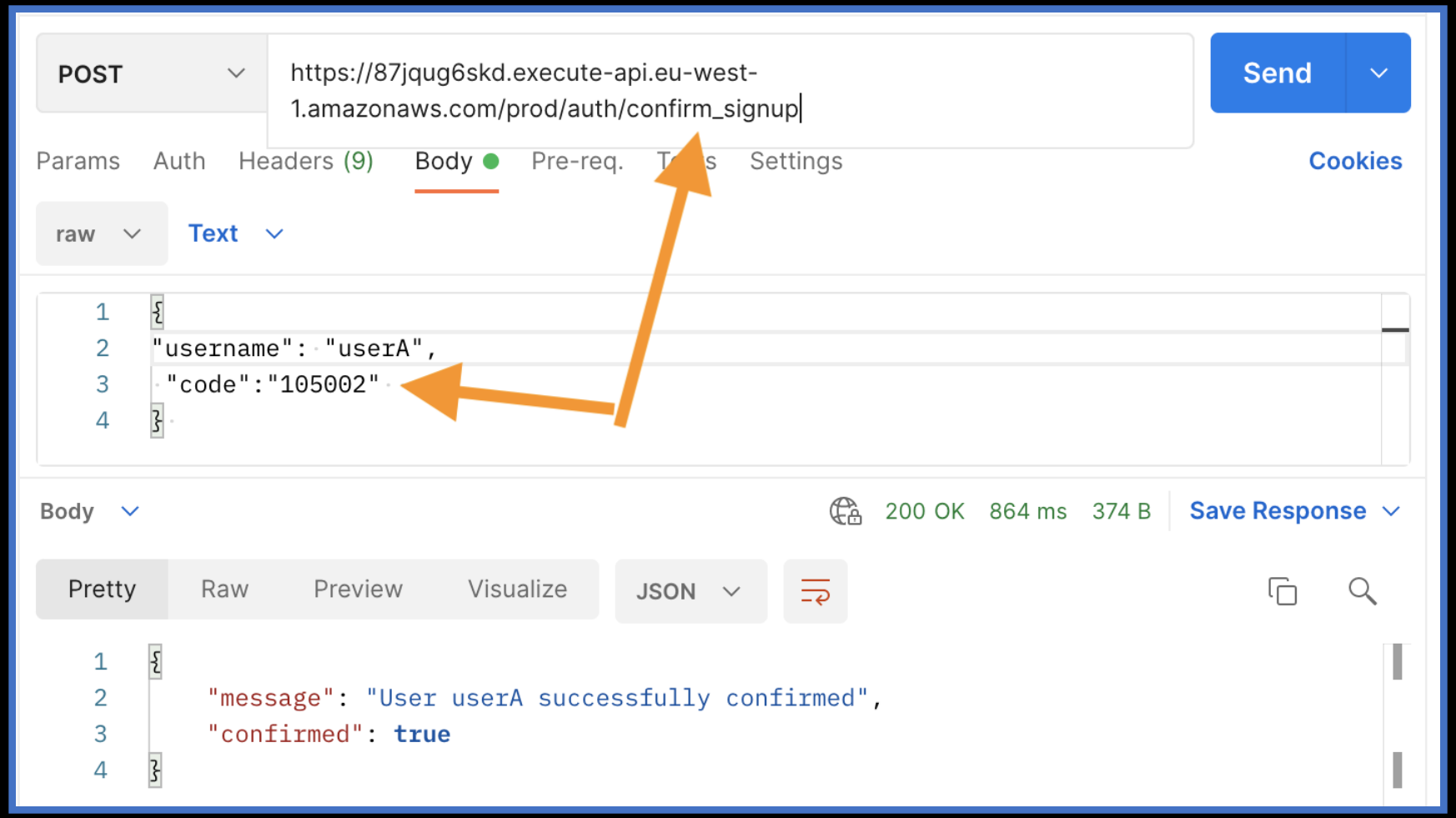
Demo – Sign up


POST
https://87jqug6skd.execute-api.eu-west-1.amazonaws.com/prod/auth/signu ...
Send
Params
Auth
Headers (9)
Body
Pre-req.
Tests
Settings
Cookies
raw
Text
{
"username": "userA",
"password": "passABCDE!2",
"email": "o [redacted] @gmail.com"
}
Body
200 OK
1630 ms
613 B
Save Response
Pretty
Raw
Preview
Visualize
JSON
{
"message": {
"$metadata": {
"httpStatusCode": 200,
"requestId": "ad8071ef-a53a-4df9-8b0c-c96fb5631bbe",
"attempts": 1,
Bootcamp
Runner
Trash

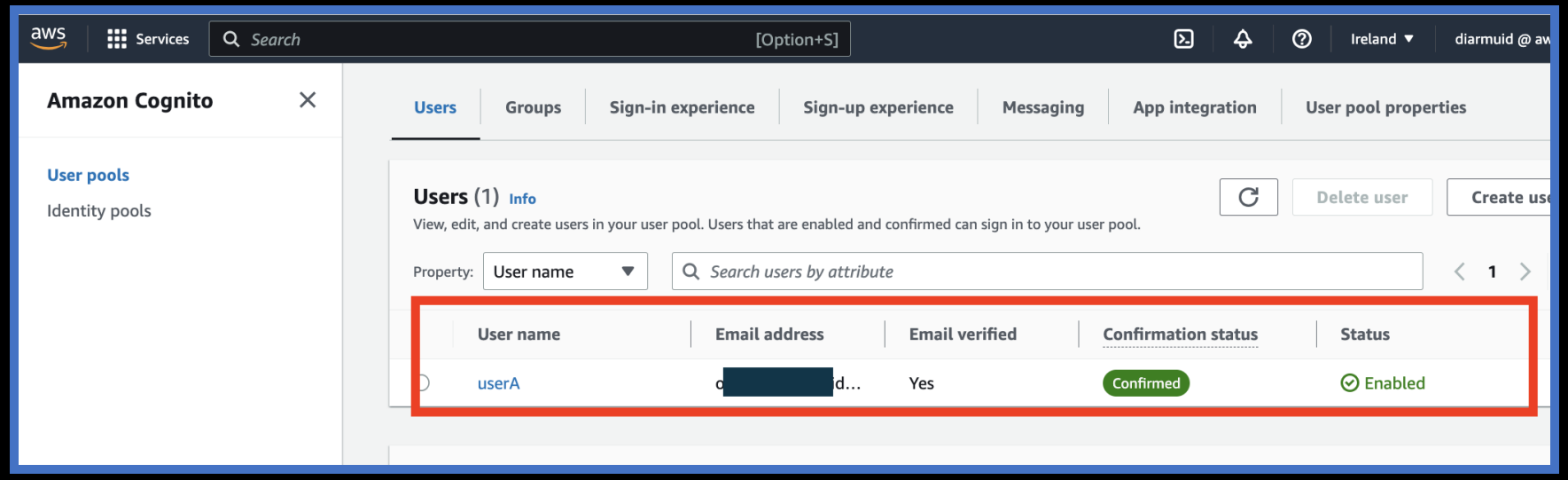
Demo – SignUp

```
130  const client = new CognitoIdentityProviderClient({ region: "eu-west-1" });
131
132  export const handler: APIGatewayProxyHandlerV2 = async (event) => {
133
134    const { username, email, password }: eventBody = JSON.parse(event.body);
135
136    const params: SignUpCommandInput = {
137      ClientId: process.env.CLIENT_ID!,
138      Username: username,
139      Password: password,
140      UserAttributes: [{ Name: "email", Value: email }],
141    };
142
143    try {
144      const command = new SignUpCommand(params);
145      const res = await client.send(command);
146      return {
147        statusCode: 200,
148        body: JSON.stringify({
149          message: res,
150        }),
151      };
152    } catch (err) {....}
153  };
```

Demo – Confirm SignUp



Demo – Confirm SignUp

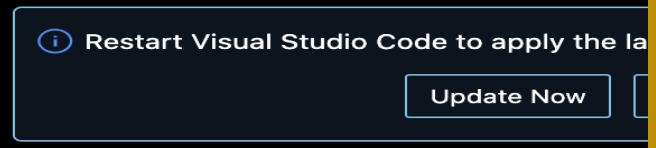


Demo – Confirm SignUp

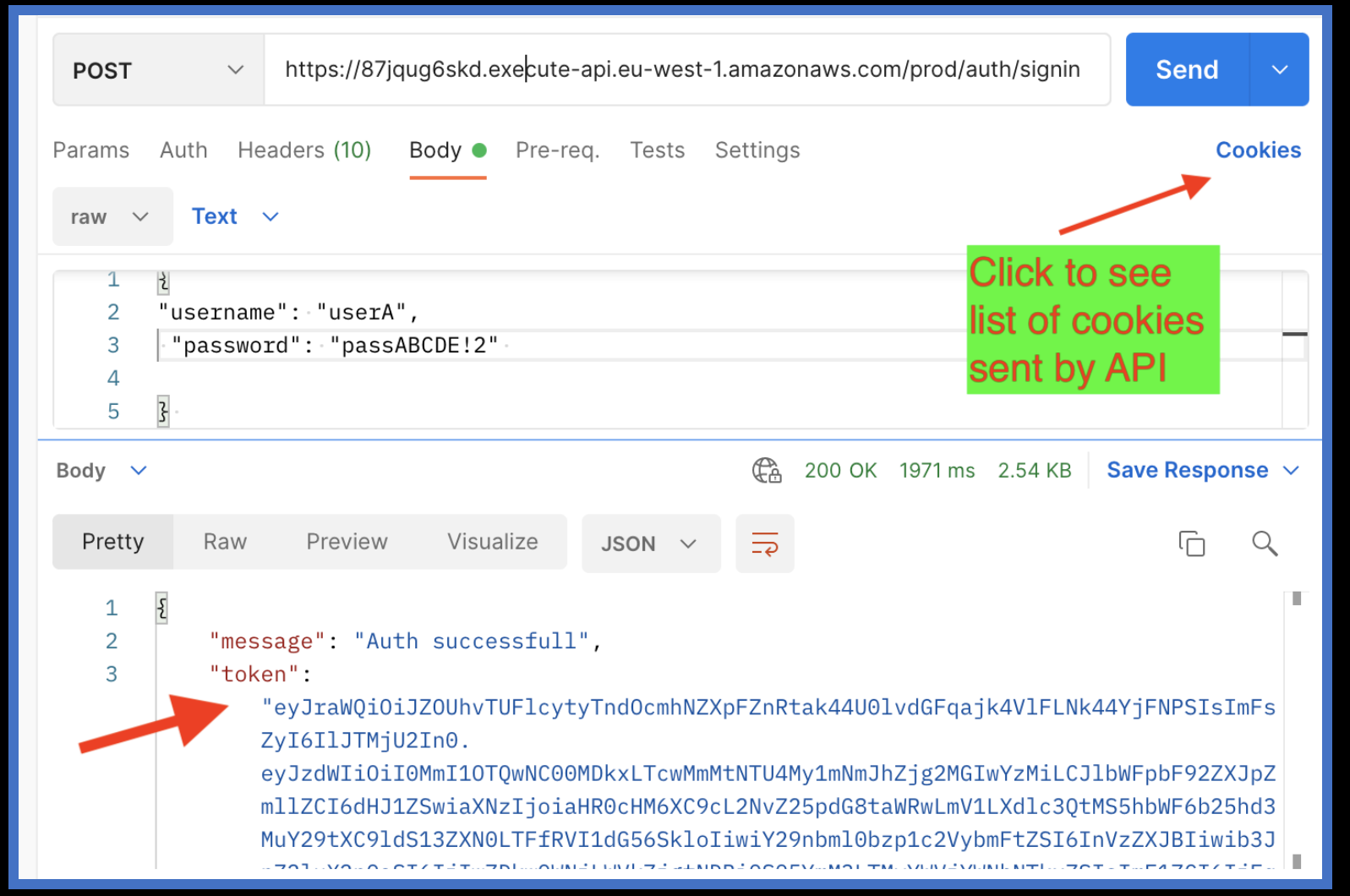
```
157  const client = new CognitoIdentityProviderClient({ region: "eu-west-1" });
158
159  type eventBody = { username: string; code: string };
160
161  export const handler: APIGatewayProxyHandlerV2 = async (event) => {
162
163    const { username, code }: eventBody = JSON.parse(event.body);
164
165    const params: ConfirmSignUpCommandInput = {
166      ClientId: process.env.CLIENT_ID!,
167      Username: username,
168      ConfirmationCode: code,
169    };
170
171    try {
172      const command = new ConfirmSignUpCommand(params);
173      const res = await client.send(command);
174
175      return {
176        statusCode: 200,
177        body: JSON.stringify({
178          message: `User ${username} successfully confirmed`,
179          confirmed: true,
180        }),
181      };
182    } catch (err) { ....}      You, 1 second ago • Uncommitted changes
183  };
```

Demo – Sign In

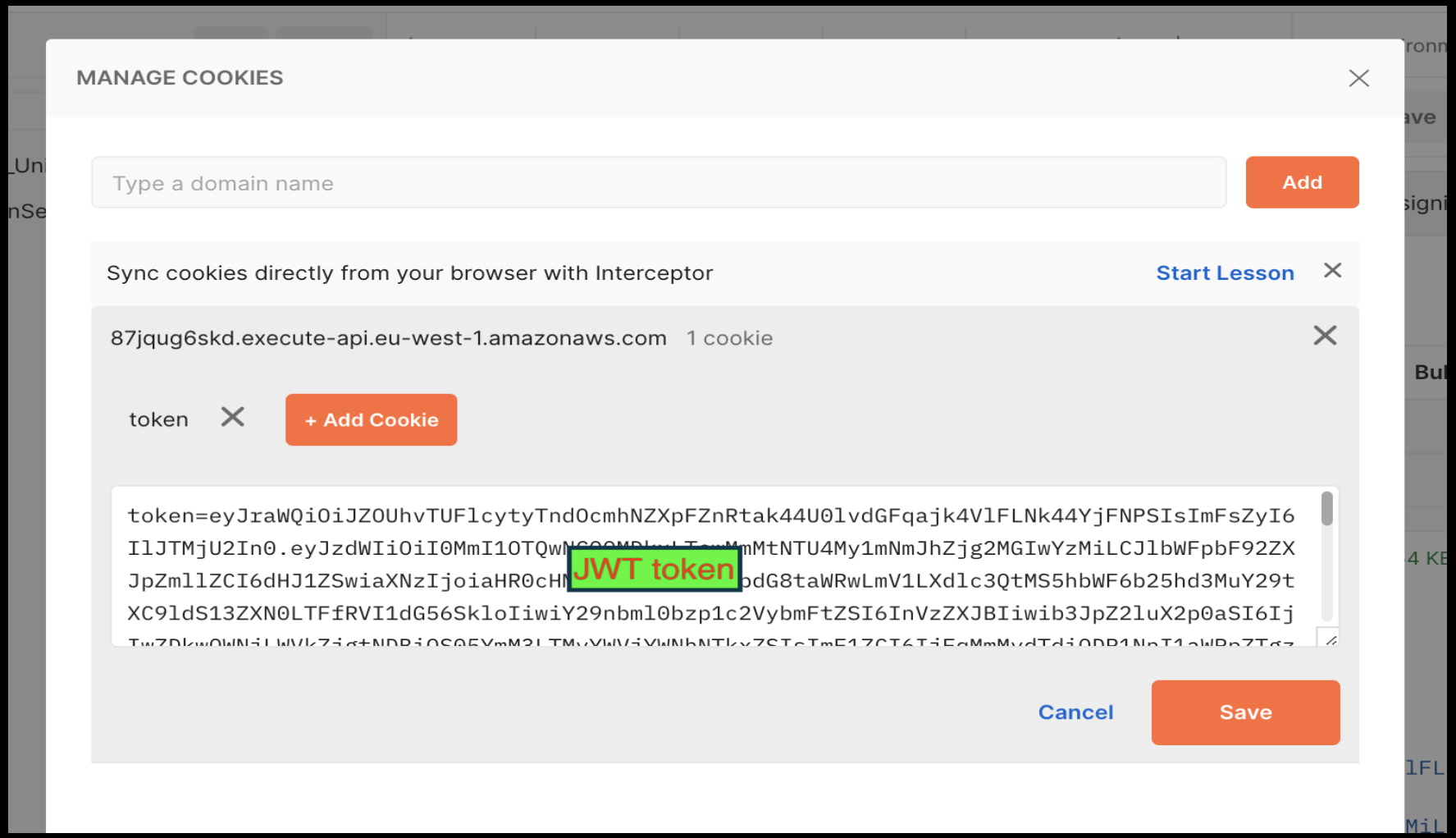
```
186
187  const client = new CognitoIdentityProviderClient({ region: "eu-west-1" });
188
189  export const handler: APIGatewayProxyHandlerV2 = async (event) => {
190    const { username, password } = JSON.parse(event.body);
191    const params: InitiateAuthCommandInput = {
192      ClientId: process.env.CLIENT_ID!,
193      AuthFlow: "USER_PASSWORD_AUTH",
194      AuthParameters: {
195        USERNAME: username,
196        PASSWORD: password,
197      },
198    };
199    try {
200      const command = new InitiateAuthCommand(params);
201      const { AuthenticationResult } = await client.send(command);
202      const token = AuthenticationResult.IdToken;
203
204      return {
205        statusCode: 200,
206        headers: {
207          "Access-Control-Allow-Headers": "*",
208          "Access-Control-Allow-Origin": "*",
209          "Set-Cookie": `token=${token}; SameSite=None; Secure; HttpOnly; Path=/; M
210        },
211        body: JSON.stringify({
212          message: "Auth successfull",
213          token: token,
214        }),
215      };
216    } catch (err) {.... }
217  };
```



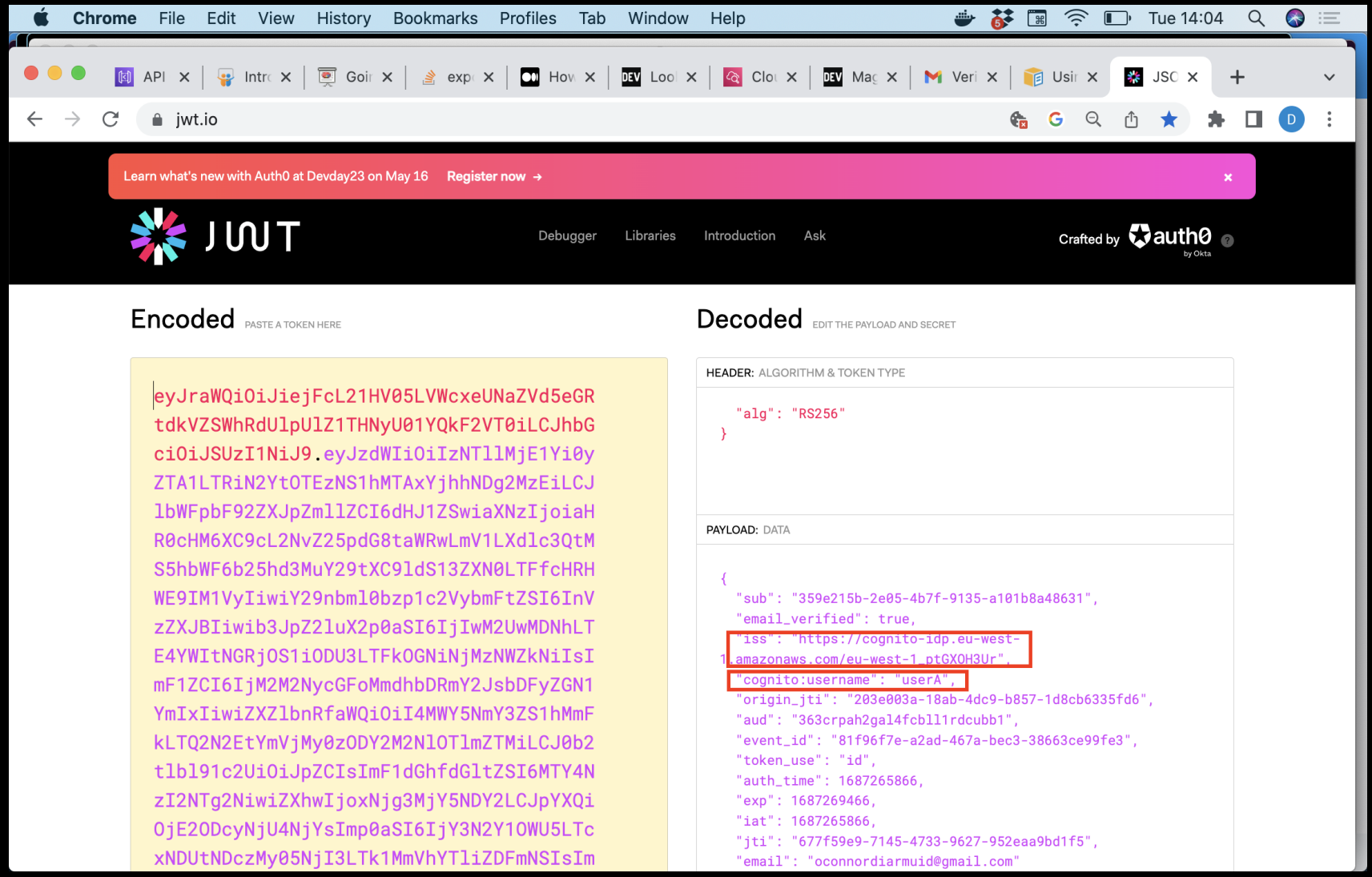
Demo – Sign In request / response



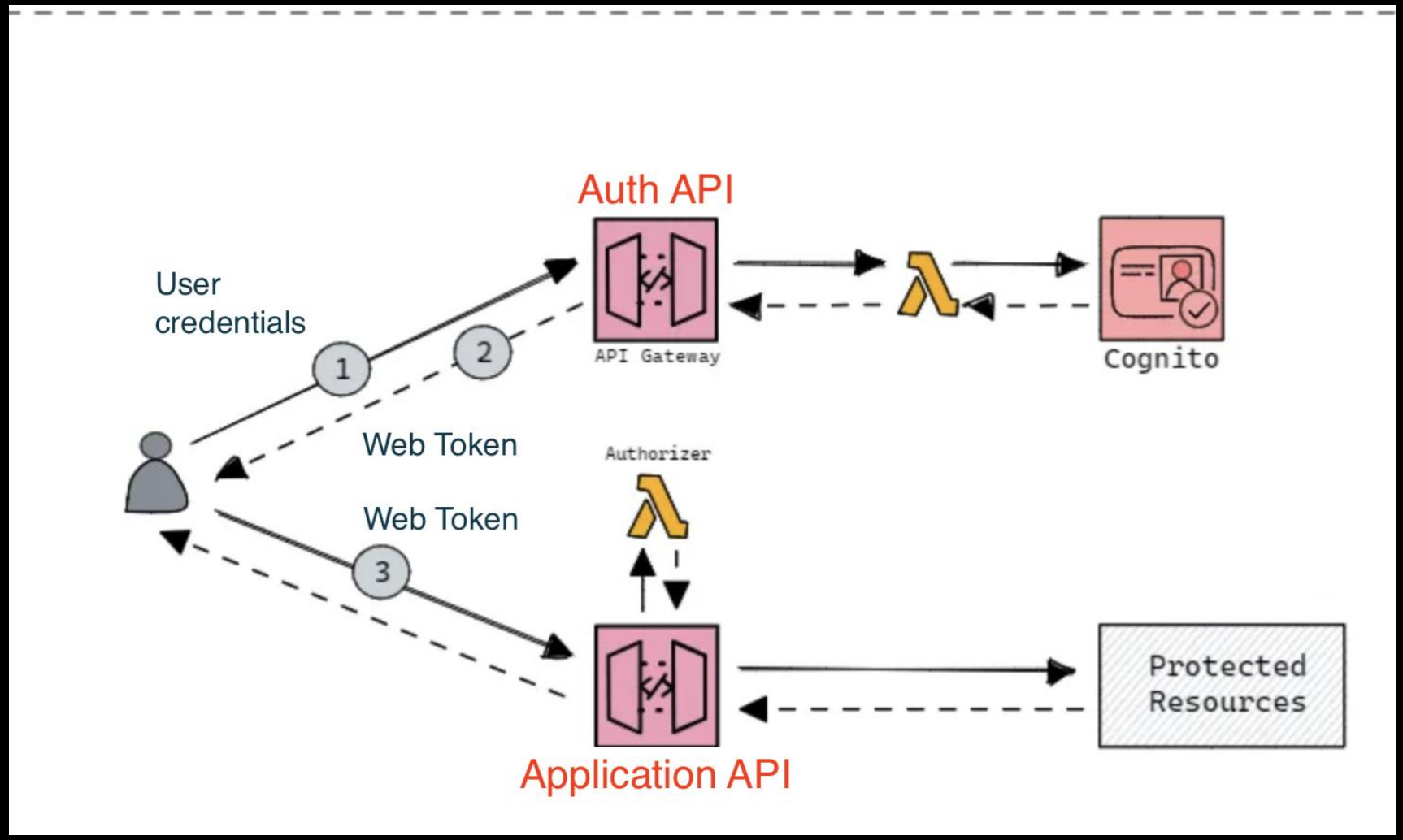
Demo – Sign In JWT token



JWT token decoding



Demo - Architecture

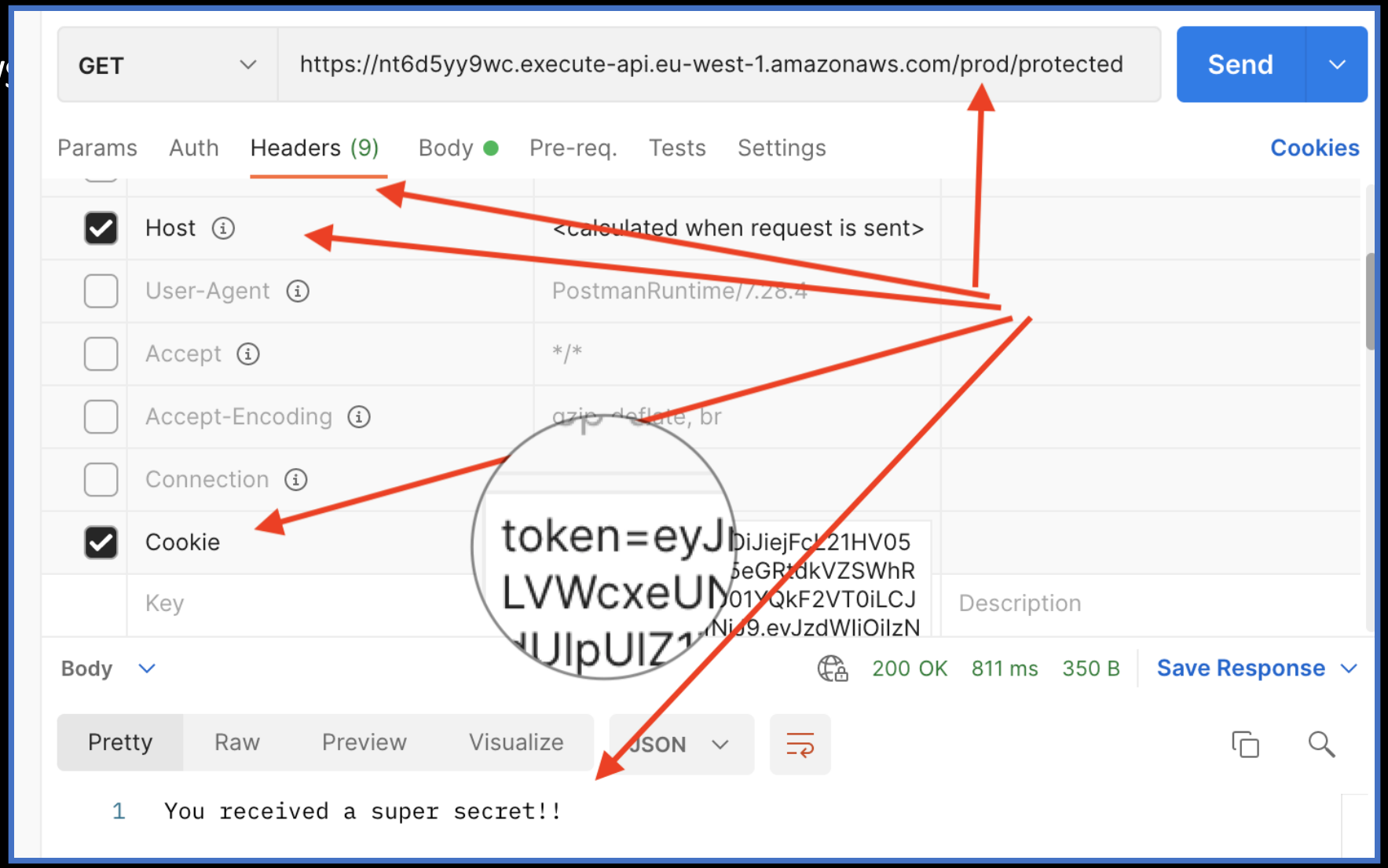


Demo – App API infrastructure.

```
230  const api = new RestApi(this, "App Api", .....);
231
232  const protectedRes = api.root.addResource("protected");
233  const publicRes = api.root.addResource("public");
234
235  const protectedFn = new NodejsFunction(this, "ProtectedFn", ....);
236  const publicFn = new NodejsFunction(this, "PublicFn", ....);
237
238  const authorizerFn = new NodejsFunction(this, "AuthorizerFn", .....);
239
240  const requestAuthorizer = new RequestAuthorizer(this, "RequestAuthorizer", {
241    identitySources: [IdentitySource.header("cookie")],
242    handler: authorizerFn,
243    resultsCacheTtl: Duration.minutes(0),
244  });
245
246  protectedRes.addMethod("GET", new LambdaIntegration(protectedFn), {
247    authorizer: requestAuthorizer,
248    authorizationType: AuthorizationType.CUSTOM,
249  });
250
251  publicRes.addMethod("GET", new LambdaIntegration(publicFn));
252
```

Demo – Protected route HTTP request

- For AW



Demo – Path parameters

- Steps performed by authorizer:

1. Parse HTTP Request Cookie header value & store in a local Map data structure.
2. Find ‘token’ key in the Map.
3. If not found:
   - Return an IAM policy Denying use of the App Web API.
4. Verify the token - Decode and check user exists in the User pool.
5. If successful verification:
   - Return IAM policy that Allows execution of the App Web API.
   - Else
   - Return policy Denying execution of the App Web API.

API Keys & Usage plans

- API keys are alphanumeric string values that you distribute to application developers to grant access to your API.
  - Keys can be generated by the API Gateway service, or imported into API Gateway from an external source.

- A usage plan specifies who can access one or more deployed API stages (e.g. dev, prod) methods, and optionally sets the target request rate to start throttling requests.
  - A plan uses API keys to identify the clients, and determine their access rights to associated APIs.

API Keys & Usage plans