

A7 - Web Architecture Specification

LBAW . Databases and Web Applications
MIEIC, 2021/22 Edition

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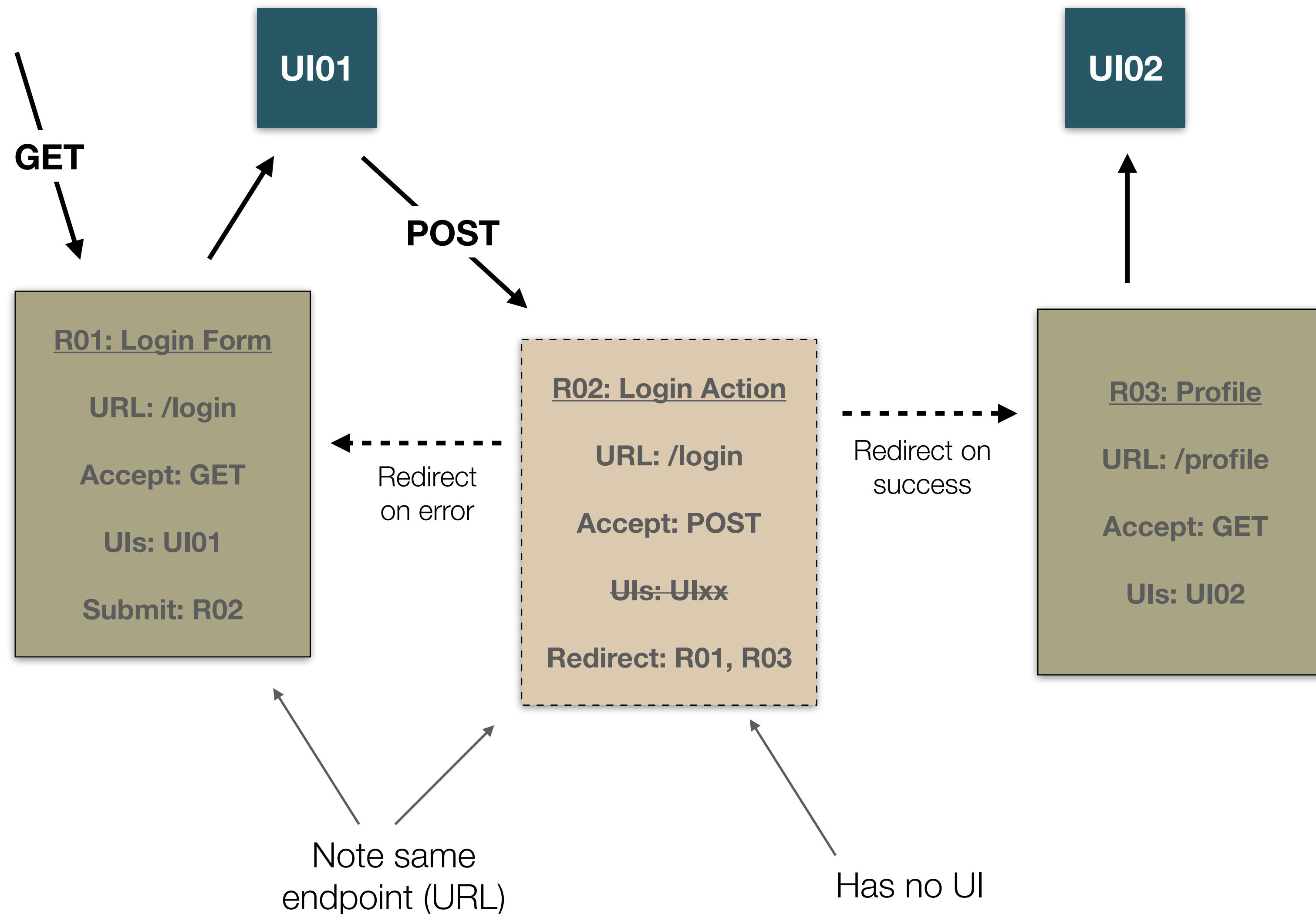
Caveats

- Significant changes from last year.
- Adopted OpenAPI standard to document endpoints.
- This is not a lecture on OpenAPI, we are using selected parts as needed.
- A work in progress..

Web Resources

- 'Web resources' represent your web application endpoint.
- The A7 artefact corresponds to the identification and description of endpoints.
- Types of endpoints:
 - **View endpoints**: show user interface to the user (A3 UIs), returns HTML;
 - **Action endpoints**: process information then redirects to view endpoint;
 - **AJAX endpoints**: available for asynchronous calls, returns JSON / HTML*.
- * *JSON output requires rendering on the client; HTML is pre-rendered on the server.*

Overall Architecture – "View-Action Pages Pattern"



OpenAPI

- Goal: standardize on how APIs are described.
- <https://spec.openapis.org/oas/v3.1.0>
 - "The OpenAPI Specification (OAS) defines a standard, programming language-agnostic interface description for REST APIs, which allows both humans and computers to discover and understand the capabilities of a service without requiring access to source code, additional documentation, or inspection of network traffic."
- The OpenAPI Initiative (OAI) is anchored under the Linux Foundation.
- An OpenAPI document is a JSON object, and may be represented either in JSON or YAML.

Example OpenAPI Document (YAML)

```
openapi: 3.0.0

info:
  title: Sample API
  description: Optional multiline or single-line description in [CommonMark](http://commonmark.org/help/) or HTML.
  version: 0.1.9

servers:
- url: http://api.example.com/v1
  description: Optional server description, e.g. Main (production) server

paths:
  /users:
    get:
      summary: Returns a list of users.
      description: Optional extended description in CommonMark or HTML.
      responses:
        '200': # status code
          description: A JSON array of user names
          content:
            application/json:
              schema:
                type: array
                items:
                  type: string
```

Metadata

```
openapi: '3.0.0'

info:
  version: '1.0'
  title: 'LBAW MediaLibrary Web API'
  description: 'Web Resources Specification (A7) for MediaLibrary'
```

External Documentation

```
externalDocs:  
  description: Find more info here.  
  url: https://web.fe.up.pt/~jlopes/doku.php/teach/lbaw/medialib/a07
```


Servers

- The servers section specifies the API server and base URL. You can define one or several servers, such as production and sandbox.
- All API paths are relative to the server URL.

```
servers:  
- url: http://lbaw-prod.fe.up.pt  
  description: Production server
```

Tags

- Used to grouping API operations (endpoints).
- Use for the defined modules.

```
tags:  
  - name: 'M01: Authentication and Individual Profile'  
  - name: 'M02: Works'  
  - name: 'M03: Reviews and Wish list'  
  - name: 'M04: Loans'  
  - name: 'M05: User Administration and Static pages'
```

Paths

→ In OpenAPI terms, **paths** are endpoints (resources) that your API exposes, and operations are the HTTP methods used to manipulate these paths, such as GET, POST or DELETE.

```
paths:  
  /ping:  
    ...  
  /users:  
    ...  
  /users/{id}:  
    ...
```

View Page (HTTP GET)

R101: Login Form

URL	/login
Description	Page with a form to login to a user account.
Method	GET
UI	UI06
SUBMIT	R102
Permissions	PUB

View Page (HTTP GET) OpenAPI

```
/login:
  get:
    operationId: R101
    summary: 'R101: Login Form'
    description: 'Provide login form. Access: PUB'

    tags:
      - 'M01: Authentication and Individual Profile'

    responses:
      '200':
        description: 'Ok. Show [UI06](https://web.fe.up.pt/~jlopes/doku.php/teach/lbaw/medialib/a03#ui06log_in)'
```

Action Page (HTTP POST) – Form Submission

R102: Login Action

URL	/login	
Description	This web resource logs the user into the system. Redirects to the user profile page on success and the login form on failure.	
Method	POST	
Request Body	+email: string	Username
	+password: string	Password
Redirects	R106	Success
	R101	Error
Permissions	PUB	

Action Page (HTTP POST) – Form Submission OpenAPI (1/3)

→ Endpoint header.

```
[/login:]
```

```
  post:
```

```
    operationId: R102
```

```
    summary: 'R102: Login Action'
```

```
    description: 'Processes the login form submission. Access: PUB'
```

```
    tags:
```

```
      - 'M01: Authentication and Individual Profile'
```

Action Page (HTTP POST) – Form Submission OpenAPI (2/3)

- Request body section defines the accepted parameters.
- Note the different types, and the required parameters.

```
[/login:]  
  
[post:]  
  
  requestBody:  
    required: true  
    content:  
      application/x-www-form-urlencoded:  
        schema:  
          type: object  
          properties:  
            email:      # <!-- form field name  
              type: string  
            password:   # <!-- form field name  
              type: string  
          required:  
            - email  
            - password
```


Action Page (HTTP POST) – Form Submission OpenAPI (3/3)

→ All action pages have redirects.

```
responses:
  '302':
    description: 'Redirect after processing the login credentials.'
    headers:
      Location:
        schema:
          type: string
    examples:
      302Success:
        description: 'Successful authentication. Redirect to user profile.'
        value: '/users/{id}'
      302Error:
        description: 'Failed authentication. Redirect to login form.'
        value: '/login'
```

Action Page – Logout

R103: Logout Action

URL	/logout	
Description	This web resource logs out the authenticated user or admin.	
Method	POST	
Redirects	R101	Success
Permissions	USR, ADM	

Action Page – Logout

```
/logout:

post:
  operationId: R103
  summary: 'R103: Logout Action'
  description: 'Logout the current authenticated user. Access: USR, ADM'
  tags:
    - 'M01: Authentication and Individual Profile'

responses:
  '302':
    description: 'Redirect after processing logout.'
    headers:
      Location:
        schema:
          type: string
        examples:
          302Success:
            description: 'Successful logout. Redirect to login form.'
            value: '/login'
```

View Page – Register Form

R104: Register Form

URL	/register
Description	Page with a form to register a new user account.
Method	GET
UI	UI07
SUBMIT	R105
Permissions	PUB

View Page – Register Form

```
/register:

get:
  operationId: R104
  summary: 'R104: Register Form'
  description: 'Provide new user registration form. Access: PUB'
  tags:
    - 'M01: Authentication and Individual Profile'

  responses:
    '200':
      description: 'Ok. Show [UI07](https://web.fe.up.pt/~jlopes/doku.php/doc/lbaw/201920/medialib/a03#ui07sign_up)'
```

Action Page – Register

R105: Register Action

URL	/register	
Description	This web resource inserts the user into the system. Redirects to the user profile page on success and the register form on failure.	
Method	POST	
Request Body	+name: string	Name
	+email: string	Email
	+password: string	Password
	?picture: file	Profile picture
Redirects	R106	Success
	R104	Error
Permissions	PUB	

Action Page — Register (1/3)

post:

operationId: R105

summary: 'R105: Register Action'

description: 'Processes the new user registration form submission. Access: PUB'

tags:

- 'M01: Authentication and Individual Profile'

Action Page — Register (2/3)

```
requestBody:
  required: true
  content:
    application/x-www-form-urlencoded:
      schema:
        type: object
        properties:
          name:
            type: string
          email:
            type: string
          picture:
            type: string
            format: binary
        required:
          - email
          - password
```


Action Page — Register (3/3)

```
responses:
  '302':
    description: 'Redirect after processing the new user information.'
    headers:
      Location:
        schema:
          type: string
        examples:
          302Success:
            description: 'Successful authentication. Redirect to user profile.'
            value: '/users/{id}'
          302Failure:
            description: 'Failed authentication. Redirect to login form.'
            value: '/login'
```

View Page – View User

R106: View Profile

URL	/users/{id}	
Description	Shows the user individual profile page.	
Method	GET	
Parameters	+id: integer	user primary key
UI	UI14	
Permissions	USR	

View Page — View User

```
/users/{id}:
  get:
    operationId: R106
    summary: 'R106: View user profile'
    description: 'Show the individual user profile. Access: USR'
    tags:
      - 'M01: Authentication and Individual Profile'

    parameters:
      - in: path
        name: id
        schema:
          type: integer
        required: true

    responses:
      '200':
        description: 'Ok. Show [UI14](https://web.fe.up.pt/~jlopes/doku.php/doc/lbaw/201920/medialib/a03#ui14profile)'
```

AJAX Page – Search Works

R202: Search Work API

URL	/api/works	
Description	This web resource searches the system for works and returns the results.	
Method	GET	
Parameters	?query: string	String field to search for in works
	?item: string	Category of the work
	?loaned: boolean	Boolean with the loaned flag value
	?owner: boolean	Boolean with the owner flag value
	?classification: integer	Integer with the work classification
Response body	JSON202	
Permissions	PUB	

AJAX Page – Search Works (1/3)

```
/api/works:  
  get:  
    operationId: R202  
    summary: 'R202: Search Works API'  
    description: 'Searches for works and returns the results as JSON. Access: PUB.'
```

AJAX Page – Search Works (2/3)

```
parameters:
  - in: query
    name: query
    description: String to use for full-text search
    schema:
      type: string
    required: false
  - in: query
    name: item
    description: Category of the works
    schema:
      type: string
    required: false
  - in: query
    name: loaned
    description: Boolean with the loaned flag value
    schema:
      type: boolean
    required: false
  - in: query
    name: owner
    description: Boolean with the owner flag value
    schema:
      type: boolean
    required: false
  - in: query
    name: classification
    description: Integer corresponding to the work classification
    schema:
      type: integer
    required: false
```

AJAX Page – Search Works (3/3)

```
responses:
  '200':
    description: Success
    content:
      application/json:
        schema:
          type: array
          items:
            type: object
            properties:
              id:
                type: string
              title:
                type: string
              obs:
                type: string
              year:
                type: string
              owner:
                type: string
              type:
                type: string
```

continue -->

--> continued

```
example:
  - id: 1
    title: Rihanna - Unapologetic
    obs: Good pop music album.
    year: 2012
    owner: Joana Lima
    type: MP3
  - id: 15
    title: Mr. Bean
    obs: The best comedy movie.
    year: 1995
    owner: Manuel Teixeira
    type: DVD
```

Swagger Documentation

- Use Swagger to publish an HTML version of the documentation
 - Create new API in Swagger
 - Use Swagget to validate the specification
 - Publish the specification in Swagger
 - Obtain 'documentation link' and add it to the A7 artefact
- MediaLibrary example
 - <https://app.swaggerhub.com/apis-docs/snunes/MediaLibrary/1.0>

OpenAPI References

→ There is a growing collection of OpenAPI related tools

→ Data Validators

→ Documentation

→ GUI Editors

→ SDK Generators

→ Text Editors

→ ...

→ Check <https://openapi.tools>