



SOFTWARE
ARCHITECTURE

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API Description Languages - OpenAPI

APIs Description - What is it?

- Human-Machine Readable Specification of a RESTful API.
- Facilitates its use and comprehension.
- Enables automation of:
 - Creation of Documentation
 - Code SDKs
 - Creation of Test Cases
 - Mocking and Stubbing

APIs description languages

- Web Services Description Language (WSDL)
 - Commonly used in SOAP (XML)
- **OpenAPI (REST)**

OpenAPI - What is it?



- Description of HTTP-based APIs (commonly RESTful) that eases its usage and comprehension by the consumer (user-application).
- Comprised of a YAML file (API specification) that delineates inputs, outputs, and guidelines for accessing and consuming it.
- This specification can be manually created or automatically generated using a tool directly from the code itself.

OpenAPI API Specification



- A self-contained resource that defines the elements of the API.
 - It must include at least:
 - One path field.
 - One components or webhook field.
- In the specification, we can find:
 - Path Schemes: These specify different parameters (e.g., the number of questions in `/questionservice/{}`)
 - Resource Types: Including text-plain, JSON, text + JSON, html + JSON...
 - HTTP Status Codes: Used to indicate results, such as 500 for errors or 200 for success

API Specification- Example



OpenAPI version

openapi: 3.0.0

info:

title: Gateway API
description: Gateway OpenApi specification.
version: 0.1.9

servers:

- url: http://localhost:8000
description: Development server

paths:

...

Information: name,
description and API version

Servers-Host on which the API
is made available

gatewayservice/openapi.yaml

```
openapi: 3.0.0
info:
  title: Gateway API
  description: Gateway OpenApi specification.
  version: 0.1.9
servers:
  - url: http://localhost:8000
    description: Development server
paths:
  /users:
    post:
      summary: Adds a new user to the database.
      requestBody:
        required: true
        content:
          application/json:
            schema:
              type: object
              properties:
                username:
                  type: string
                  description: The user ID.
                password:
                  type: string
                  description: The user password.
      responses:
        '200':
          # status code
          description: OK
        '400':
          # status code
          description: The user cannot be added
          content:
            application/json:
              schema:
                type: object
                properties:
                  error:
                    type: string
                    description: Information about the error.
```



API Specification- Example



...
paths:
/adduser:

Paths: one for each available endpoint

post:
summary: Adds a new user to the database.

requestBody:
required: true
content:

Type of operation

application/json:
schema:

Request body specification:
(if is mandatory): content,
type and scheme

username:
type: string
description: The user ID.
password:
type: string
description: The user password.

Type and description of each attribute

responses:

```
gatewayservice/openapi.yaml

openapi: 3.0.0
info:
  title: Gateway API
  description: Gateway OpenApi specification.
  version: 0.1.9
servers:
  - url: http://localhost:8000

paths:
  /adduser:
    post:
      summary: Adds a new user to the database.
      requestBody:
        required: true
        content:
          application/json:
            schema:
              type: object
              properties:
                username:
                  type: string
                  description: The user ID.
                password:
                  type: string
                  description: The user password.
      responses:
        '200':
          description: OK
        '400':
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          description: The user cannot be added
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API Specification- Example



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 '200': # status code
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 '400': # status code
 description: The user cannot be added
 content:
 application/json:
 schema:
 type: object
 properties:
 error:
 type: string
 description: Information about the error.

Path outputs (responses):
descriptions, types, and
content with their schemes
for each

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        content:
          application/json:
            schema:
              type: object
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                  description: Information about the error.
```



Good Practices



- Defining the specification before its implementation:
 - Enables us to focus on functionality and identify issues earlier.
 - Ease interoperability between different types of services.
- Synchronize/update the specification with the API changes [1]

[1] Alberto Martin-Lopez, Sergio Segura, and Antonio Ruiz-Cortés. FSE22. Online testing of RESTful APIs: promises and challenges.

Swagger



- Toolkit that eases the API specification deployment
- Enables:
 - Read the specification in a easy and clear way.
 - Check the different endpoints and hosts where the API is made available.
 - Available in the Gateway service (gatewayservice) of wichat_o:
 - <http://localhost:8000/api-doc>

