Setzen wir erstmal einen Vertag auf

Contract First API Entwicklung mit OpenAPI

Herbstcampus 15.09.2021, Birgit Kratz

About me

Birgit Kratz

- Freelancing IT Consultant
- Java-Backend
- More than 20 years experience
- Co-Organizer of Softwerkskammer in Düsseldorf and Köln (Cologne)
- Email: mail@birgitkratz.de
- Twitter: @bikratz
- Github: https://github.com/bkratz

Agenda

What is an API

What is a REST(ful) API

Comparison of Code-First vs Contract-First API development approach

Tools supporting the Contract-First approach

Codegeration

Demo

Experiences

What is an API

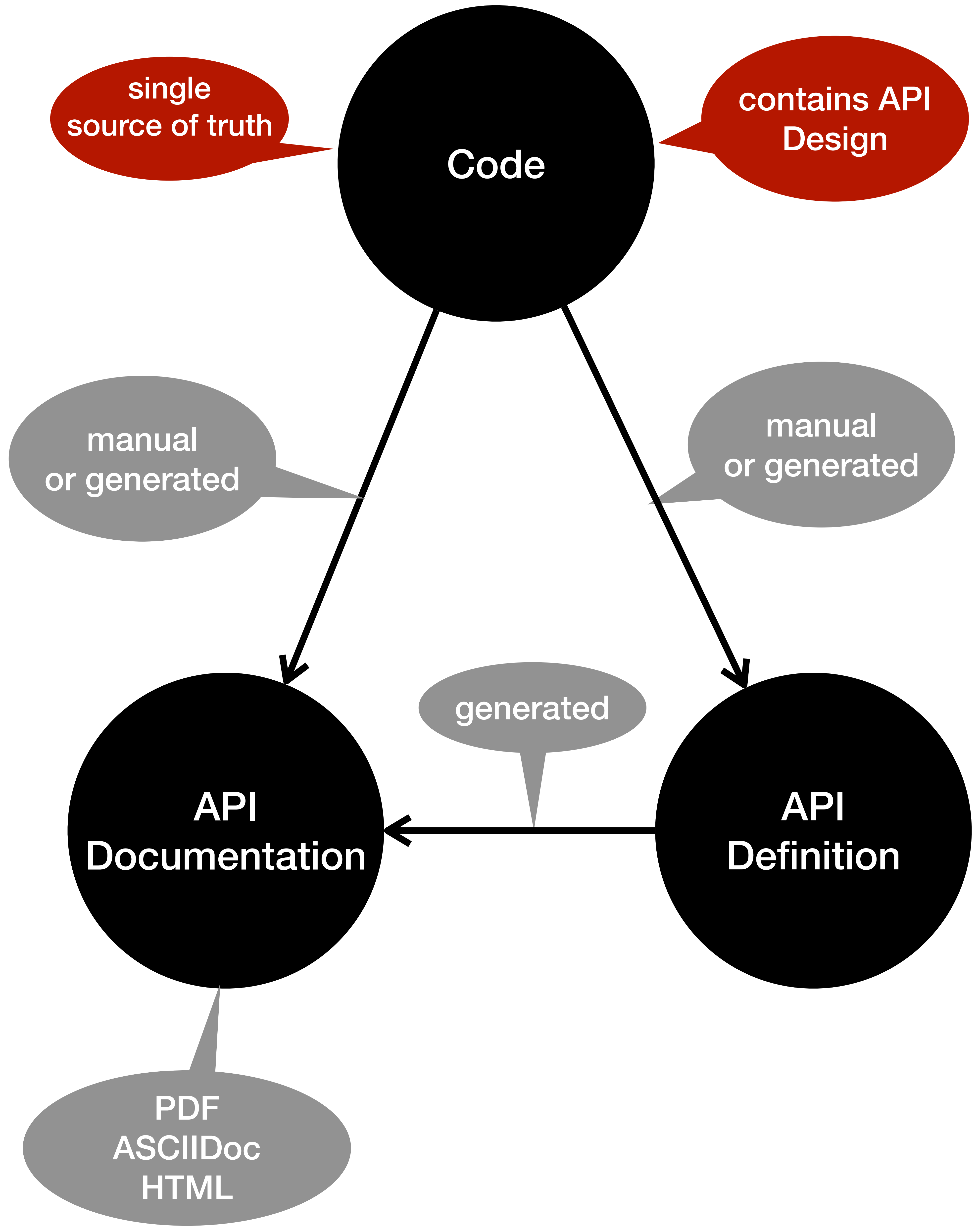
- **A**pplication **P**rogramming **I**nterface
- “It is a type of software interface, offering a service to other pieces of software” (Wikipedia)
- Enables communication between computers or computer programs
- A document or standard that describes how to build such a connection or interface is called an *API specification*.
- Internal API, Partner/Customer API, Public/OpenSource API

What is a REST(ful) web API

- REST - Representational State Transfer
- RESTful web APIs are typically loosely based on HTTP methods to access resources via URL-encoded parameters and the use of JSON or XML to transmit data.
- Client-/Server communication, stateless, synchron
- Consistent access from a clients to resources of a server (a client can be a browser, a mobile app or another program “M2M”)
- Use of HTTP protocol (GET, POST, PUT, DELETE, …, Authentication, Caching, Compression, Status Codes)
- HATEOAS - Hypermedia As The Engine Of Application State

How to develop a (RESTful) API

Code First



Advantages

If eher already exists (legacy) code, ist is a simple way to create an API definition and documentation. The resulting API definition can later turn into the single source of truth

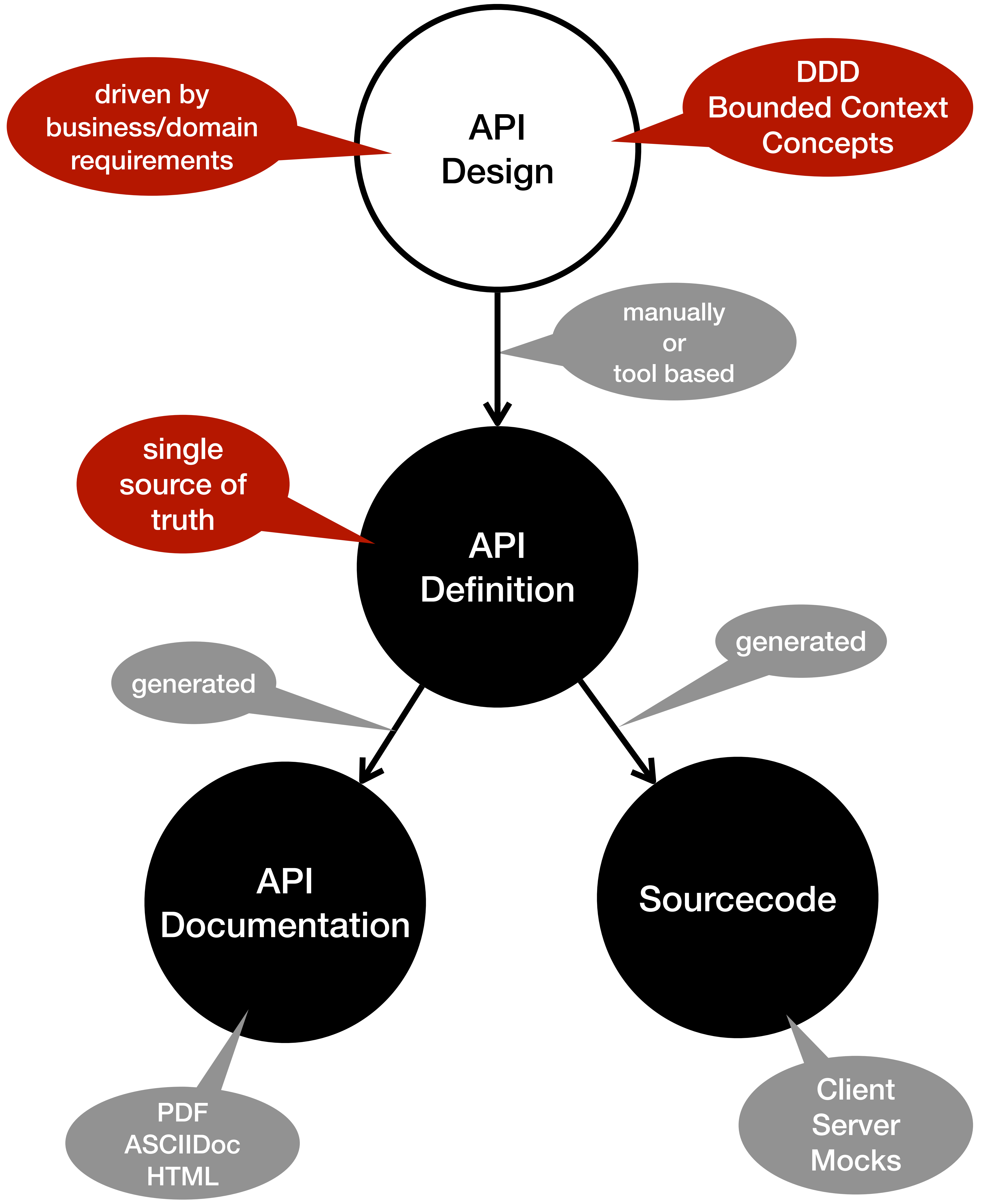
Disadvantages

API Definition has the tendency to become outdated if the code changes an it is not automatically created from the code

Client implementation only possible after server implementation has been finished and the API definition/documentation has been published

API Definition has the tendency to represent technical rather than domain aspects

API Specification First



Advantages

API Definition is driven by business/domain aspects and is single source of truth

Automatic generation source stubs and documentation

Server and client implementation can be done simultaneously and independent

Disadvantages

Tools that help generating source stubs sometimes do not cover all possibilities given by the API specification

Tools

OpenAPI Specification

https://spec.openapis.org/oas/v3.0.3

https://swagger.io/specification

https://swagger.io/docs/specification

Editors

Online Swagger Editor:
https://editor.swagger.io/

IntelliJ IDEA Plugin: OpenAPI (Swagger) Editor
https://plugins.jetbrains.com/plugin/14837-openapi-swagger-editor

Code Generator openapi-generator-maven-plugin

https://github.com/OpenAPITools/openapi-generator

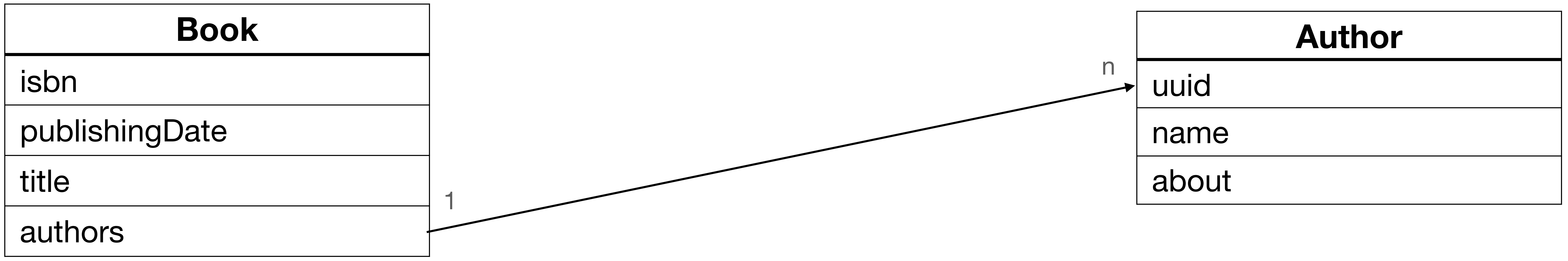
https://github.com/OpenAPITools/openapi-generator/tree/master/modules/openapi-generator-maven-plugin

https://openapi-generator.tech/

More Tools

https://openapi.tools/

Beispielprojekt: Bookshelf



GET /books - get a list of all books
GET /books/{isbn} - get book details
POST /books - create a book
PUT /books/{isbn} - change a book
DELETE /books/{isbn} - delete a book

GET /books/author/{name}
get all books by author name

GET /authors/{uuid}/books
get all books for an specific author

GET /authors - get a list of all authors
GET /authors/{uuid} - get author details
POST /authors - create an author
PUT /authors/{uuid} - change an author
DELETE /authors/{isbn} -delete an author

API Definition with OpenAPI Specification

Path Definitions

```yaml
paths:
  /books:
    get:
      summary: fetch all books
      operationId: fetchAllBooks
      responses:
        200:
          description: returns a list of books
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: "#/components/schemas/Book"
        204:
          description: no books found
        401:
          $ref: “#/components/responses/Unauthorized"
```

```yaml
paths:
  /books:
    post:
      summary: add new book
      operationId: addBook
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: "#/components/schemas/Book"
      responses:
        201:
          description: created
          content:
            application/json:
              schema:
                $ref: "#/components/schemas/Book"
        401:
          $ref: "#/components/responses/Unauthorized"
```

Schema Definitions

```yaml
components:
  schemas:
    Book:
      type: object
      required:
        - isbn
      properties:
        title:
          description: title of the book
          type: string
        isbn:
          type: string
          pattern: "[1-9]{13}"
        authors:
          description: names of authors
          type: array
          items:
            type: string
```

Demo

Other topics

API Versioning

```
servers:
  - url: /v1
  - url: /v2
```

✓

```
paths:
  /books:
    get:
      operationId: fetchAllBooksV1
        responses:
          200:
            description: list of books V1
            content:
              application/json;version1:
                schema:
                  type: array
                  items:
                    $ref: "#/components/schemas/Book"
    get:
      operationId: fetchAllBooksV2
        responses:
          200:
            description: list of books v2
            content:
              application/json;version2:
                schema:
                  type: array
                  items:
                    $ref: "#/components/schemas/Book"
```

✗

Security

Describing Security

```
components:
  securitySchemas:
    ApiKeyAuth:
      type: apiKey
      in: header
      name: X-API-Key
    OAuth2:
      type: oauth2
      flows: clientCredentials
        tokenUrl: ‘path/to/token/url’
        scopes: {}
```

Applying Security

```
security:
  - ApiKeyAuth: []
  - OAuth2: []
```

Links != HATEOAS

```
responses:
  '201':
    description: Created
    content:
      application/json:
        schema:
          type: object
          properties:
            isbn:
              type: string
              format: “[1-9]{13}
    links:
      GetBookByIsbn:
        operationId: fetchByIsbn
        parameters:
          isbn: ‘$response.body#/isbn'
```

```
/books/isbn/{isbn}:
  get:
   operationId: fetchByIsbn
   parameters:
     - in: path
       name: isbn
       required: true
       schema:
         type: integer
         format: int64
   responses: …
```

AsyncAPI
for event-driven architecture

https://www.asyncapi.com/

Thank you

Beispielcode: https://github.com/bkratz/contract_first_bookshelf

- Email: mail@birgitkratz.de
- Twitter: @bikratz
- Github: https://githib.com/bkratz