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Communicating Our APIs:
Enhance Provider and Consumer Interaction

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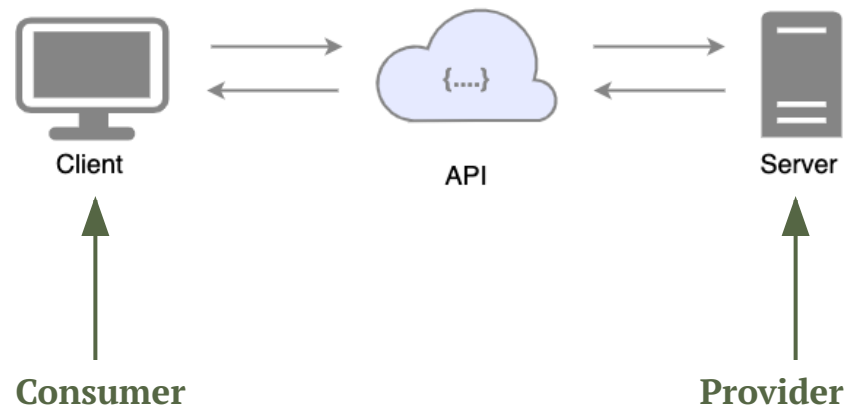
APIs

"An application programming interface (API) is a way for two or more computer programs to communicate with each other."

Source: Wikipedia, "API"



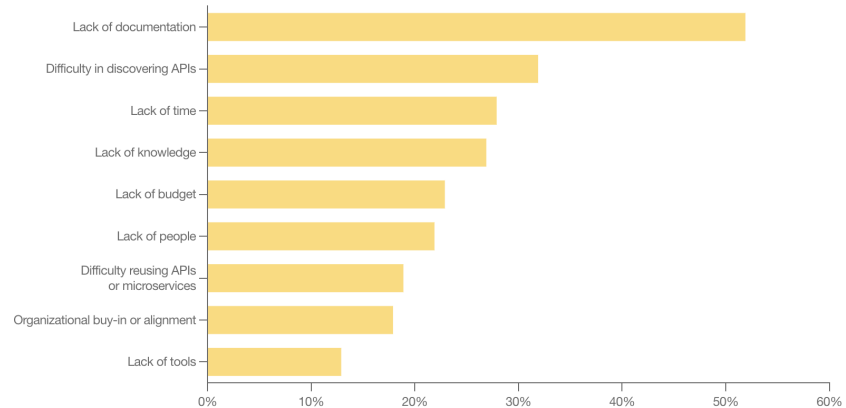
Communication Boundaries

- Private APIs
  - Provider and consumer are developers in the same team or same organisation
- Partner Facing APIs
  - Serving partners (i.e.: Payment Service Providers)
  - Provider and consumer might not communicate directly
- Public APIs
  - Publicly available (i.e… Geo-Location services)
  - Communication at scale: Many Consumers ↔ 1 Provider

Communication Challenges

Top 3 Obstacles to consuming APIs

- Lack of documentation
- Difficulty in discovering APIs
- Lack of time



Source: Postman, "2023 State of the API Report"

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Enhancing API Discoverability

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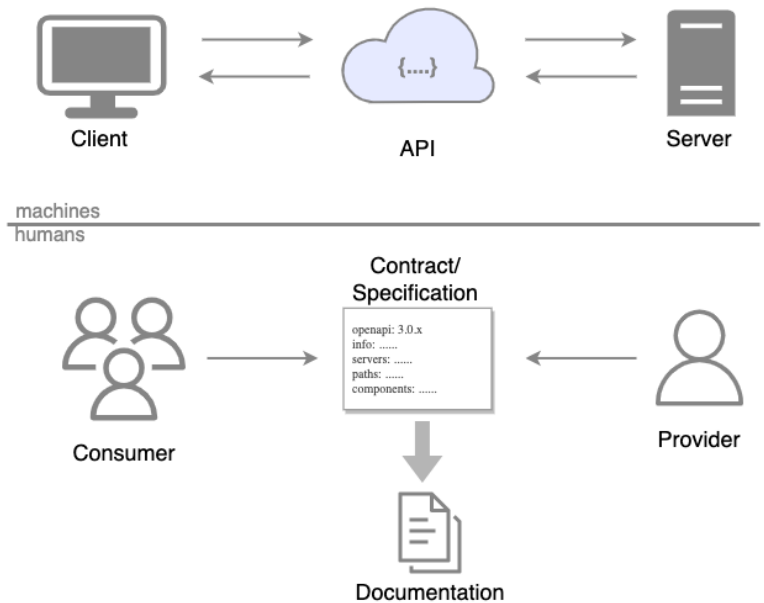
API Specifications



- Specification language for the APIs
  - OpenAPI/Swagger for REST APIs
  - AsyncAPI for message-driven APIs
  - WSDL for SOAP Web Services
  - GraphQL Schema for GraphQL
  - GRPC
- Standard for API discovery
- Foundation for documentation

OpenAPI Specification

- Technology agnostic standard to describe Rest APIs
- Formerly Swagger, OpenAPI as of version 3
- Written as JSON or YAML
- Great tooling for code and documentation generation
- https://openapi.tools/

OpenAPI Specification

```yaml
openapi: 3.0.3
info:
  title: Recipes API
  ...
servers:
- url: http://localhost:8080
paths:
  /recipes:
    get:
      summary: List all recipes
      ...
      responses:
        ...
        "200":
          description: OK
          content:
            'application/json':
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/Recipe'
```

- **Openapi:** Spec Version
- **Info:** General API information as metadata
- **Servers:** Connectivity information about target servers
- **Paths:** Paths to the endpoints with their expected request, response and errors.
- **Components:** Holds the schemas for the request, response and errors for referencing

AsyncAPI Specification

- Technology agnostic standard to describe message-driven APIs
- An adaptation of the OpenAPI specification
- Written as JSON or YAML
- Protocols: AMQP, HTTP, JMS, Kafka, but not only
- https://www.asyncapi.com/tools

AsyncAPI Specification

```yaml
asyncapi: 2.0.0
info:
  title: Ping Service
  ...

servers:
  localhost:
    url: localhost:9092
    protocol: kafka
    protocolVersion: '1.0.0'

channels:
  ping.topic:
    description: Kafka topic for ping messages
    publish:
      operationId: pingSent
      message:
        $ref : '#/components/messages/Ping'
  pong.topic:
    description: Kafka topic for pong messages
    subscribe:
      operationId: pongReceived
```

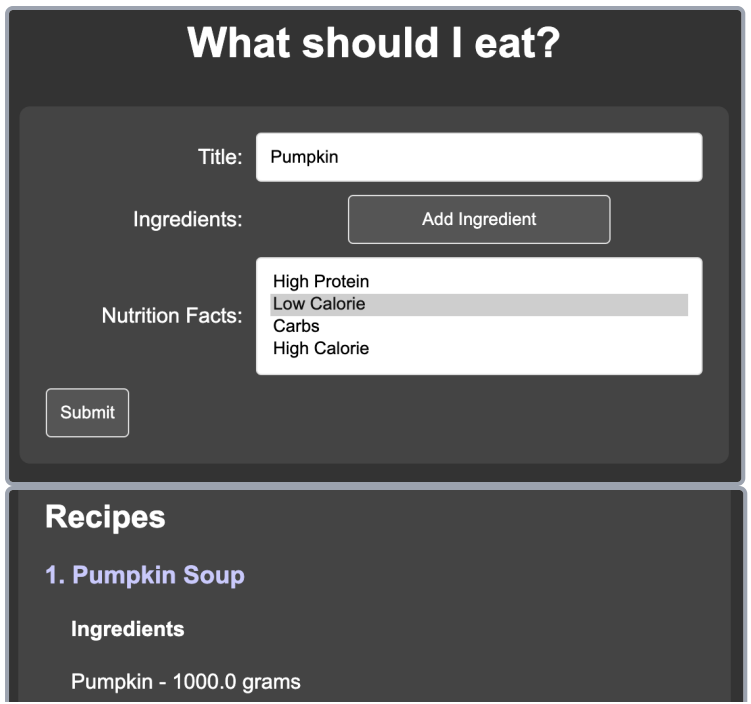
- **Asyncapi:** Spec Version
- **Info:** Metadata information about the API
- **Servers:** Connectivity information about servers (i.e. Kafka brokers)
- **Channels:** Messages exchange between provider and consumer
- **Components:** Defines the reusable objects such as schemas or messages which could be referenced.

Enhancing API development

Recipes API

Let's build an API

Client



Server

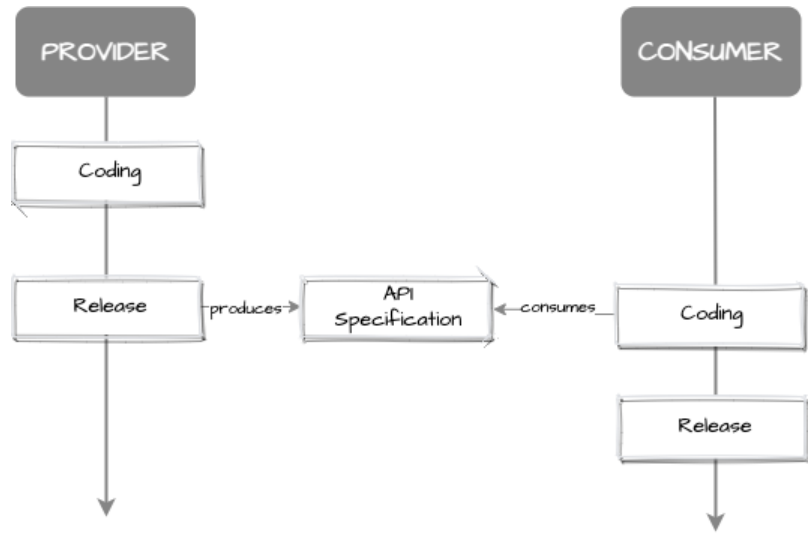
```
curl 'http://localhost:8080/recipes?title=Pumpkin&nutritior
```


```
[
    {
        "title": "Pumpkin Soup",
        "ingredients": [
            {
                "name": "Pumpkin",
                "quantity": 1000.0,
                "unit": "grams"
            },
            {
                "name": "Onion",
                "quantity": 1.0,
                "unit": "unit"
            },
            {
                "name": "Vegetable broth",
```

API Development - Code First

Communicate API specification once coding has been done

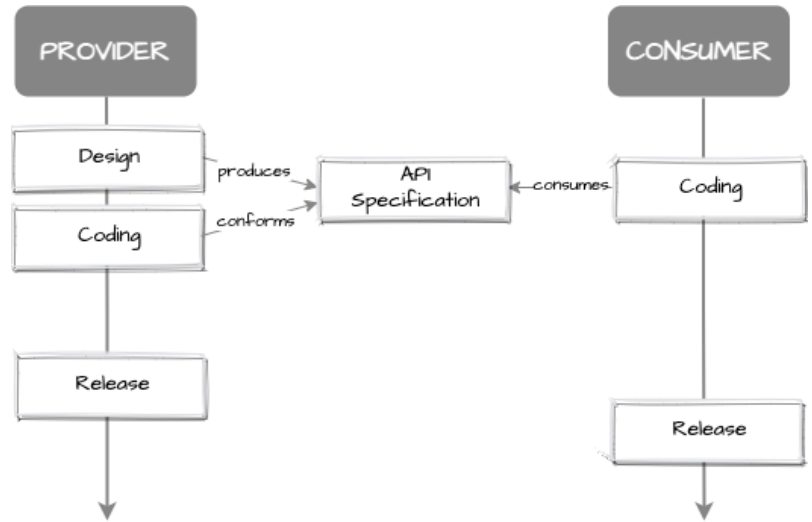
- **Advantages:**
  - Focus on coding
  - Flexibility to change the API design
- **Disadvantages:**
  - Late communication with the consumer
  - Does not enable development in parallel
  - Annotations



API Development - API First

Communicate API specification before coding. Prioritizes API design over implementation.

- **Advantages:**
  - Early communication with the consumer
  - Documentation thought ahead
  - Enables development in parallel
- **Disadvantages:**
  - Less flexibility to change the API design
  - Sometimes bureaucratic for providers



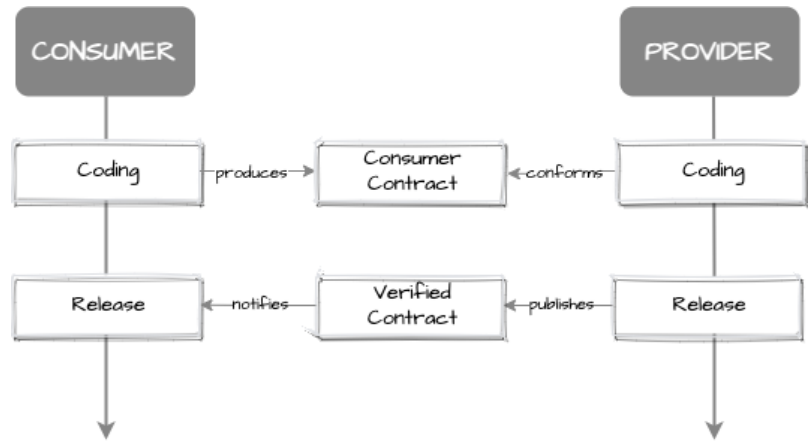
API Development - Consumer First

Consumer dictates the expected API behavior to the provider

Pact: A Code-first consumer contract testing tool that enables consumer driven API development.

Process:

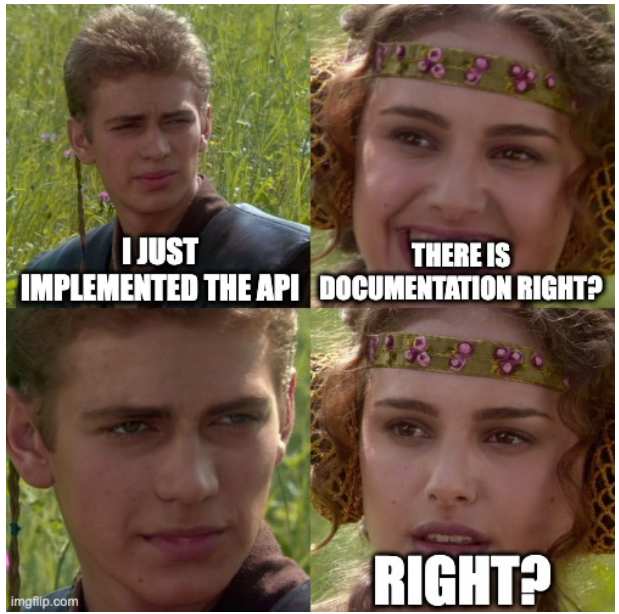
- Consumer produces a pact
- Provider verifies it's API implementation
- Server / Client deployments synced



API Development

When to use Code first?	Provider initially focuses on coding speed Flexibility to change the design
When to use API first?	API design over implementation Early communication with the consumer → Documentation Utilize code generation Large number of consumers
When to use Consumer first?	Provider should conform to consumer needs API consumer and provider test their applications independently To sync provider and consumer deployments Small number of consumers
When to mix & match?	When API first alone is not sufficient to match consumer needs

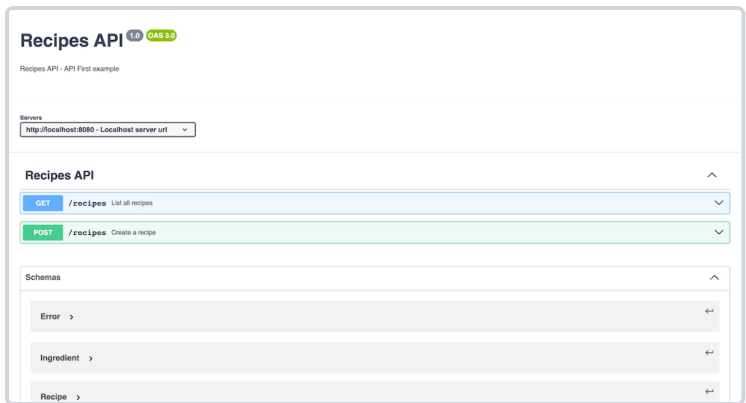
Enhancing API Documentation



API Documentation

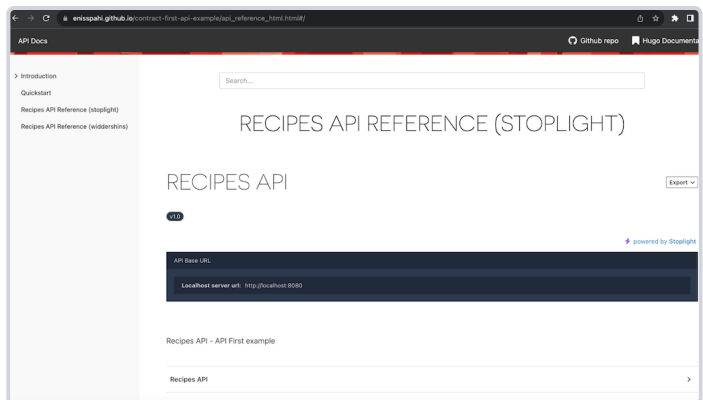
API Specifications can be leveraged to generate more human readable forms of documentation

API Reference



- APIs described as web pages
- Code samples, try-it-out
- Auto generated
- **Swagger-ui:** The most popular

API Documentation



- API Reference incorporated in a bigger ecosystem
- Conceptual technical documentation
- Docs as code: Markdown, Technical Writing
- Continuous documentation
- Demo

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Summary

Enhancing API Discoverability	Standardized language, common understanding ▪ OpenAPI, AsyncAPI, …
Enhancing API development	API Development methodology ▪ Code first, API first, Consumer first, mix & match Speed up development ▪ OpenAPI Generator, Pact, Swagger-validator
Enhancing API Documentation	API Specification → API Reference → API Docs Stay up-to-date with Continuous Documentation

OpenValue Blog

https://openvalue.blog/posts/2023/11/25/communicating_our_apis_part1/

https://openvalue.blog/posts/2023/11/26/communicating_our_apis_part2/

Code Samples

https://github.com/enisspahi/code-first-api-example

https://github.com/enisspahi/contract-first-api-example

https://github.com/enisspahi/consumer-first-api-example

https://github.com/enisspahi/async-api-example

Q&A