

The Workflows Specification

The missing piece of the API puzzle?

#apidays

I'm Frank Kilcommins

- › Principal API Technical Evangelist @ SmartBear
- › Developer and Architect (❤️ APIs & Developer Experience)
- › Governance Board member on OpenAPI Initiative (OAI)
- › Contributor on Workflows Specification

› Connect:

`/* insert embarrassing photo here */`



@fkilcommins



@frank-kilcommins

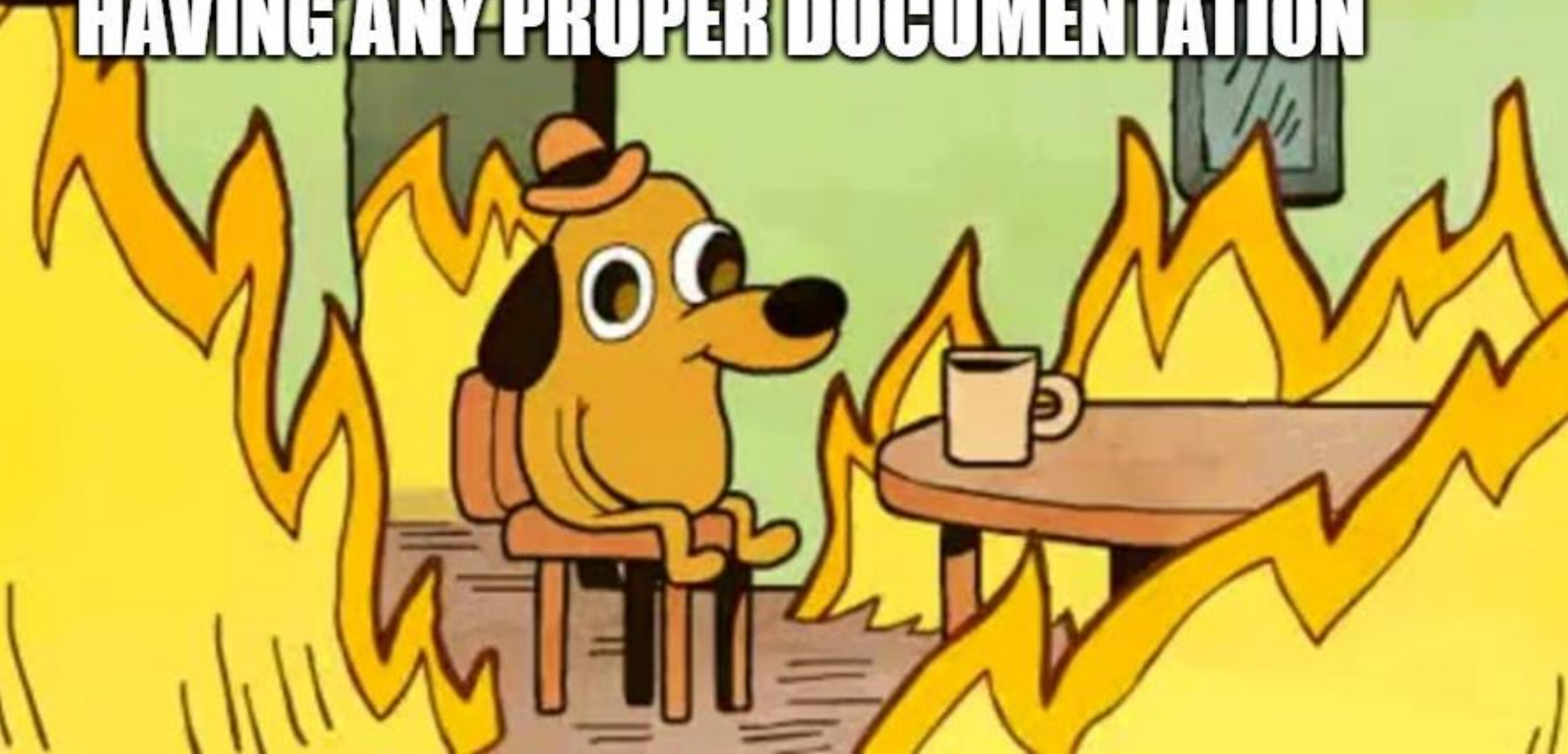


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Talk Track

- › What is the Workflows Specification
- › Use cases
- › Workflows Specification structure
- › Example
- › Q&A

**COMPANIES USING API'S WITHOUT
HAVING ANY PROPER DOCUMENTATION**



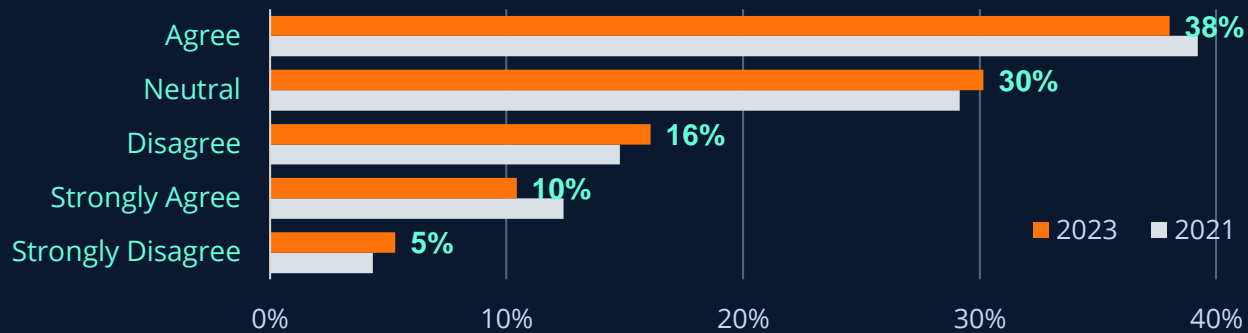


GIF by [Butler University](#)



Alignment Gap

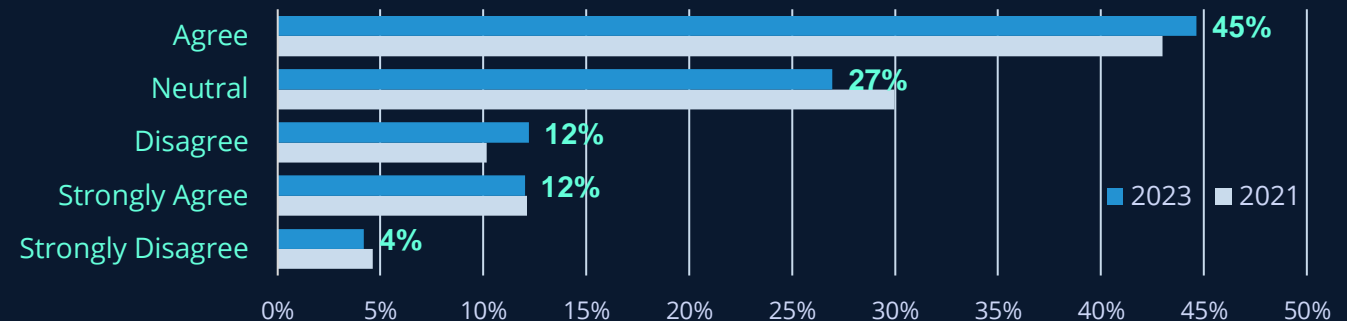
Our APIs are well documented for our consumers



› Only 48% are confident their APIs are well documented and explain value for consumers

› ~43% unsure their processes will deliver appropriate developer experience (DX)

Our organization has good processes in place to ensure APIs can be efficiently consumed





What is the Workflows Specification?

- › It describes an approach to document use-case oriented workflows in a programmatically readable format.
- › A workflow is a series of API calls which together accomplish some business objective.
- › The additional human readable nature improves the ability of API specifications to tell the story of the API(s) in a manner that can improve the consuming developer experience.

Use cases

- › Deterministic recipes for the use of APIs
 - › Make sense of large unwieldy API description
 - › Bridge the *gap* where business flows span more than one API description
- › Living API documentation and improved consumer developer experience (DX)
- › Assertable business value
- › Targeted code generation tooling for APIs driven by use cases
- › Improved regulatory checks via assertable workflows
- › The AI potential for value orientated interaction with APIs

Workflows Specification 1.0.0

info

sourceDescriptions

workflow (+)

inputs

step (+)

parameters

success
action

failure
action

outputs

outputs

Workflows Specification Structure

Workflows Specification 1.0.0

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Metadata about the defined workflows document

Workflows Specification 1.0.0

Metadata about the defined workflows document

info

Workflows Specification - Info Object

workflowSpec: 1.0.0

info:

title: A pet adoption workflow

summary: Search for and adoption a pet via PetCo APIs.

description: |

This workflow walks you through the steps of `searching` and `adopting` an available pet.

version: 1.0.0

outputs

Workflows Specification 1.0.0

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Metadata about the defined workflows document

Lists source descriptions (e.g., OpenAPI description) that can be referenced by one or more workflows

Workflows Specification 1.0.0

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sourceDocuments

Metadata about the defined workflows document

Describes source documents (e.g., OpenAPI document) that can be referenced by one or more workflows

Workflows Specification - SourceDescriptions Object Example

sourcesDescriptions:

- name: petsAPI
url: <https://api.swaggerhub.com/apis/frank-kilcommins/Pets-API/1.0.0/swagger.json>
type: openapi
- name: adoptionsAPI
url: <https://api.swaggerhub.com/apis/frank-kilcommins/Adoptions-API/1.0.0/swagger.json>
type: openapi

Workflows Specification 1.0.0

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Lists source descriptions (e.g., OpenAPI description) that can be referenced by one or more workflows

Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

Metadata about the defined workflows document

Workflows Specification - Workflows Object

Describes source documents (e.g., OpenAPI document) that can be referenced by one or more workflows

Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

workflows:

- workflowId: FindAndAdoptPet

summary: Search for appropriate available pet and adopt it

description: |

This workflow lays out the steps and API calls needed to search for an adopt a Pet

inputs: {}

steps: []

outputs: []

Workflows Specification 1.0.0

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Metadata about the defined workflows document

Lists source descriptions (e.g., OpenAPI description) that can be referenced by one or more workflows

Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

A JSON Schema object representing the inputs used by this workflow

Workflows specification 1.0.0

Workflows Specification - Workflow Inputs

```
info
inputs:
  type: object
  properties:
    apiKey:
      type: string
    category:
      type: string
    breed:
      type: string
    location:
      type: string
    required:
      - apiKey
      - category
      - breed
```

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Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

A JSON Schema object representing the inputs used by this workflow

The defined workflow steps, each representing a call to an API operation (or another workflow)

Workflows Specification 1.0.0

info

Metadata about the defined workflows document

sourceDocuments

Describes source documents (e.g., OpenAPI document) that can be referenced by one or more workflows

Workflows Specification - Steps Object

Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

steps:

workflow (+)

- stepId: searchPets

description: |

inputs

This step demonstrates the search pets flow for the first pet matching the criteria

operationId: petsAPI.getPets

parameters: []

successCriteria: []

onSuccess: []

onFailure: []

outputs: []

Failure
action

outputs

outputs

A JSON Schema object representing the inputs used by this workflow

The defined workflow steps, each representing a call to an API operation (or another workflow)

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A JSON Schema object representing the inputs used by this workflow

The defined workflow steps, each representing a call to an API operation (or another workflow)

A list of parameter objects, representing parameters to pass to an operation or workflow

Workflows Specification 1.0.0



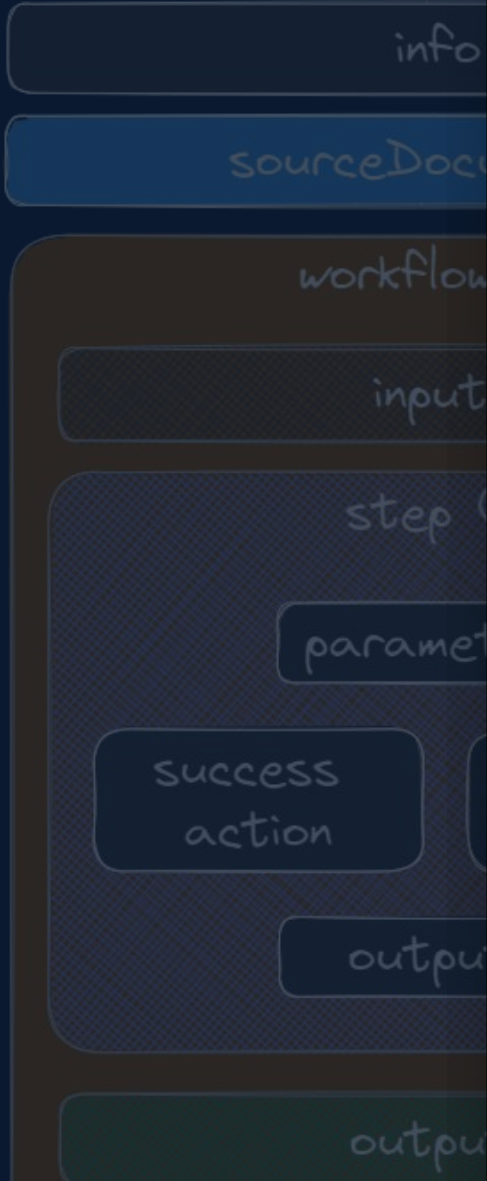
Workflows Specification - Step Parameters

```
parameters:

- name: category  
in: query  
value: $inputs.category
- name: breed  
in: query  
value: $inputs.breed
- name: location  
in: query  
value: $inputs.location
- name: page  
in: query  
value: 1
- name: pageSize  
in: query  
value: 1
- name: status  
in: query  
value: available

```

- about the defined workflows document
- Describes source documents (e.g., OpenAPI document) that can be referenced by one or more workflows
- Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.
- A JSON Schema object representing the inputs used by this workflow
- The defined workflow steps, each representing a call to an API operation (or another workflow)
- A list of parameter objects, representing parameters to pass to an operation or workflow



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The defined workflow steps, each representing a call to an API operation (or another workflow)

A list of parameter objects, representing parameters to pass to an operation or workflow

An array of failure action objects that specify what to do on step failure

Workflows Specification 1.0.0

info

sourceDocuments

Workflows Specification - FailureAction Object Example

workflow (+)

type: retry

retryAfter: 1000

retryLimit: 5

criteria:

assertions to determine if this action should be executed

- condition: \$statusCode == 503

outputs

outputs

Metadata about the defined workflows document

Describes source documents (e.g., OpenAPI document) that can be referenced by one or more workflows

A workflow is a sequence of steps that can be executed across one or more APIs to achieve an objective/outcome.

A JSON Schema object representing the inputs used by this workflow

The defined workflow steps, each representing a call to an API operation (or another workflow)

A list of parameter objects, representing parameters to pass to an operation or workflow

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An array of failure action objects that specify what to do on step failure

An array of success action objects that specify what to do upon step success

Workflows Specification 1.0.0

info

Workflows Specification - SuccessAction Object Example

```
type: goto
stepId: joinWaitingListStep
criteria:
  # assertions to determine if this action should be executed
  - context: $response.body
    condition: $[?length(@.pets) > 0]
    type: JSONPath
```

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Describes source documents (e.g. OpenAPI document) that can be referenced by one or more workflows

Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

A JSON Schema object representing the inputs used by this workflow

The defined workflow steps, each representing a call to an API operation (or another workflow)

A list of parameter objects, representing parameters to pass to an operation or workflow

failure action objects that specify what to do on step failure

An array of success action objects that specify what to do upon step success

Workflows Specification 1.0.0

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An array of failure action objects that specify what to do on step failure

An array of success action objects that specify what to do upon step success

A map between a friendly name and a dynamic output value for a step

Workflows Specification 1.0.0

info

sourceDocuments

workflow (*)

inputs

step (*)

outputs:

parameters

petId: \$response.body.pets[0].id

success
action

failure
action

outputs

outputs

Metadata about the defined workflows document

Describes source documents (e.g., OpenAPI document) that can be referenced by one or more workflows

Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

A JSON Schema object representing the inputs used by this workflow

Workflows Specification - Step Outputs

The defined workflow steps, each representing a call to an API operation (or another workflow)

A list of parameter objects, representing parameters to pass to an operation or workflow

An array of failure action objects that specify what to do on step failure

An array of success action objects that specify what to do upon step success

A map between a friendly name and a dynamic output value for a step

Workflows Specification 1.0.0

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sourceDescriptions

workflow (*)

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Metadata about the defined workflows document

Lists source descriptions (e.g., OpenAPI description) that can be referenced by one or more workflows

Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

A JSON Schema object representing the inputs used by this workflow

The defined workflow steps, each representing a call to an API operation (or another workflow)

A list of parameter objects, representing parameters to pass to an operation or workflow

An array of failure action objects that specify what to do on step failure

An array of success action objects that specify what to do upon step success

A map between a friendly name and a dynamic output value for a step

A map between a friendly name and a dynamic output value for a workflow

Workflows Specification 1.0.0

info

sourceDocuments

workflow (+)

Workflows Specification - Workflow Outputs

inputs

outputs:

petName: \$steps.searchPets.outputs.petName

petId: \$steps.searchPets.outputs.petId

adoptionStatus: \$steps.approveAdoption.outputs.status

success
action

failure
action

outputs

outputs

Metadata about the defined workflows document

Describes source documents (e.g., OpenAPI document) that can be referenced by one or more workflows

Describes the workflows to be taken across one or more APIs to achieve an objective/outcome.

A JSON Schema object representing the inputs used by this workflow

The defined workflow steps, each representing a call to an API (or other workflow)

A list of failure actions, representing parameters to pass to an operation or workflow

An array of failure action objects that specify what to do on step failure

An array of success action objects that specify what to do upon step success

A map between a friendly name and a dynamic output value for a step

A map between a friendly name and a dynamic output value for a workflow

Creating a Pet Adoption Service



Problem:

We're overwhelmed by the number of pets being abandoned at our pet store.

Solution:

Following research and evaluation, we've decided to create the ability to search for and adopt pets that we catalog.

We'll offer the service via our website but also with a wider eco-system of shelters, charities, and pet orphanages.



Example Workflow Use Case

› Adopt a pet matching specific criteria

› Steps:

1. Search for a pet
2. Initiate adoption request
3. Confirm adoption by updating status
4. Verify pet has been updated to adopted

pets offering you everything required for successful pet adoptions

GET `/pets` Get a list of pets registered with the store

GET `/pets/{petId}` Get the details on a specific pet

adoptions Adoption information for pets in our stores

GET `/adoptions` Get a list of current pet adoptions

POST `/adoptions` Add a new adoption

PATCH `/adoptions/{id}` Update the status of an adoption

Workflows Specification 1.0.0

info

sourceDescriptions

workflow (*)

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outputs

workflowSpec: 1.0.0

info:

title: A pet adoption workflow

summary: This workflow showcases how to search for and adoption a pet from the PetCo `Pet Adoptions API`.

description: This workflow walks you through the steps of `searching` for, `selecting`, and `adopting` an available pet.

version: 1.0.0

sourceDescriptions:

- name: petsAPI

url: <https://api.swaggerhub.com/apis/frank-kilcommins/Pets-API/1.0.0/swagger.json>

type: openapi

- name: adoptionsAPI

url: <https://api.swaggerhub.com/apis/frank-kilcommins/Adoptions-API/1.0.0/swagger.json>

type: openapi

workflows:

- workflowId: FindAndAdoptPet

summary: This workflow lays out the steps and API calls needed to search for and adopt a Pet

inputs:

type: object

properties:

category:

type: string

breed:

type: string

location:

type: string

required:

- apiKey

- category

- breed

steps:

- stepId: searchPets

description: This step demonstrates the search pets flow for the first pet matching the criteria

operationId: petsAPI.getPets

parameters:

- name: category

in: query

value: \$inputs.category

- name: breed

in: query

value: \$inputs.breed

- name: location

in: query

value: \$inputs.location

- name: status

in: query

value: available

successCriteria:

- condition: \$response.body

- context: \$[?length(@.pets) > 0]

condition:

type: JSONPath

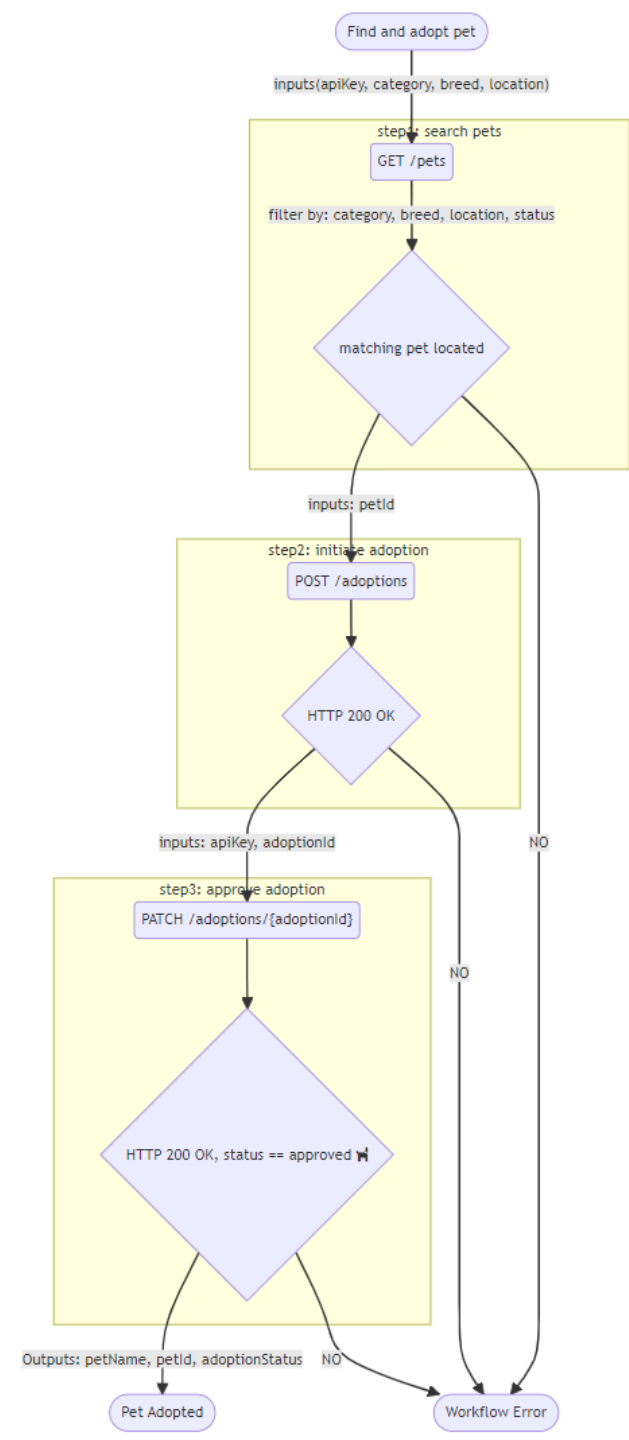
outputs:

petId: \$response.body.data.pets[0].id

petName: \$response.body.data.pets[0].name

petLocation: \$response.body.data.pets[0].location

```
workflowSpec: 1.0.0
info:
  title: A pet adoption workflow
  summary: This workflow showcases how to search for and adoption a pet from the PetCo `Pet Adoptions API`.
  description: This workflow walks you through the steps of `searching` for, `selecting`, and `adopting` an available pet.
  version: 1.0.0
sourcesDescriptions:
- name: petsAPI
  url: https://api.swaggerhub.com/apis/frank-kilcommins/Pets-API/1.0.0/swagger.json
  type: openapi
- name: adoptionsAPI
  url: https://api.swaggerhub.com/apis/frank-kilcommins/Adoptions-API/1.0.0/swagger.json
  type: openapi
workflows:
- workflowId: FindAndAdoptPet
  summary: This workflow lays out the steps and API calls needed to search for and adopt a Pet
  inputs:
    type: object
    properties:
      category:
        type: string
      breed:
        type: string
      location:
        type: string
    required:
      - apiKey
      - category
      - breed
  steps:
- stepId: searchPets
  description: This step demonstrates the search pets flow for the first pet matching the criteria
  operationId: petsAPI.getPets
  parameters:
  - name: category
    in: query
    value: $inputs.category
  - name: breed
    in: query
    value: $inputs.breed
  - name: location
    in: query
    value: $inputs.location
  - name: status
    in: query
    value: available
  successCriteria:
  - condition: $response.body
  - context: ${?length(@.pets) > 0}
    condition:
      type: JSONPath
  outputs:
    petId: $response.body.data.pets[0].id
    petName: $response.body.data.pets[0].name
    petLocation: $response.body.data.pets[0].location
```



What's the status?

› Feedback round from the OAI TSC & TDC ended Dec 1st

› *Implementor DRAFT* ready for **LAUNCH**



› <https://www.openapis.org/> being updated to include the new specification

Learn more

- › Workflows Specification

- › <https://github.com/OAI/sig-workflows/blob/main/versions/1.0.0.md>

- › Examples:

- › <https://github.com/OAI/sig-workflows/tree/main/examples/1.0.0>

- › Current Examples:

- › OAuth
 - › FAPI-PAR
 - › LoginAndRetrievePets
 - › Pet-Coupons

Thank You!

Questions?

› Connect:



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@frank-kilcommins



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