The bridge to possible

Why API Contracts Matter

Panel: Best practices and lessons learnt on Cisco's API-First journey

Cory Guynn, Product Management Architect, Meraki
Einar Nilsen-Nygaard, Principal Engineer, ISE
Raghu Arur – Distinguished Engineer, Nexus Cloud
Stève Sfartz - Principal Architect – Cisco Developer Relations

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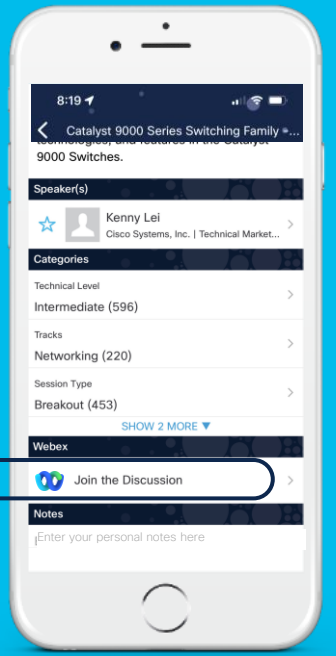

/Cisco/DevNet/StèveSfartz

- API Architect in Cisco Developer Relations
- Technical Lead for API Experience and Cisco API Guidelines: prescriptive standards and best practices for APIs
- Working to deliver a great and consistent developer experience across Cisco platforms

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github: ObjectIsAdvantag
twitter: @SteveSfartz

"vision without execution is hallucination"

Cory Guynn, Product Management Architect
Cisco Meraki

- Lead architect behind the release of Dashboard API v1 and our adoption of the OpenAPI specification
- Driven by a need to simplify everything and enable new possibilities.
- Proud *Merakian* since 2011

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Twitter: @eedionysus

"Automate all the things!"

Einar Nilsen-Nygaard, Principal Engineer
Cisco Identity Services Engine

- Architect for the Cisco Identity Services Engine and related services for Meraki Dashboard;
- previously architect for IOS XR, IOS XE and NX-OS open programmability interfaces
- Driven by a desire to open up the value in Cisco products to both end users and developers!

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Raghu Arur – Distinguished Engineer Nexus Cloud

- Chief Architect for Nexus Cloud and Nexus Insights
- Driving the simplification of Day2 Ops for Cisco networking products
- Working to deliver the best observability platform for Cisco Networking

Cisco's API-First Strategy

- Treat APIs as Product
- Versioned releases
- API Changelogs
- Backwards Compatibility
- Documentation
- Support

Backward Compatibility announcement at Partner Summit

APIs are backwards compatible, as of October 2022

Meraki Dashboard API v1

ISE API v1

Nexus Cloud API v1

SecureX Threat Response API v1

Cloud Security Open APIs v2

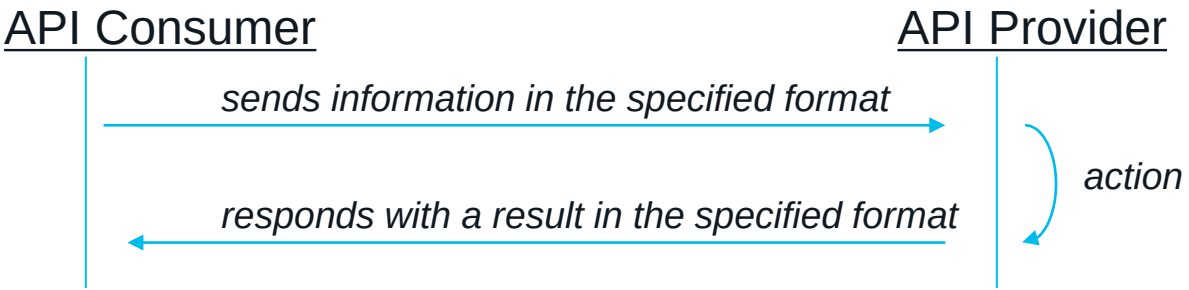
Webex API v1

pxGrid Cloud API v1

What are API Contracts?

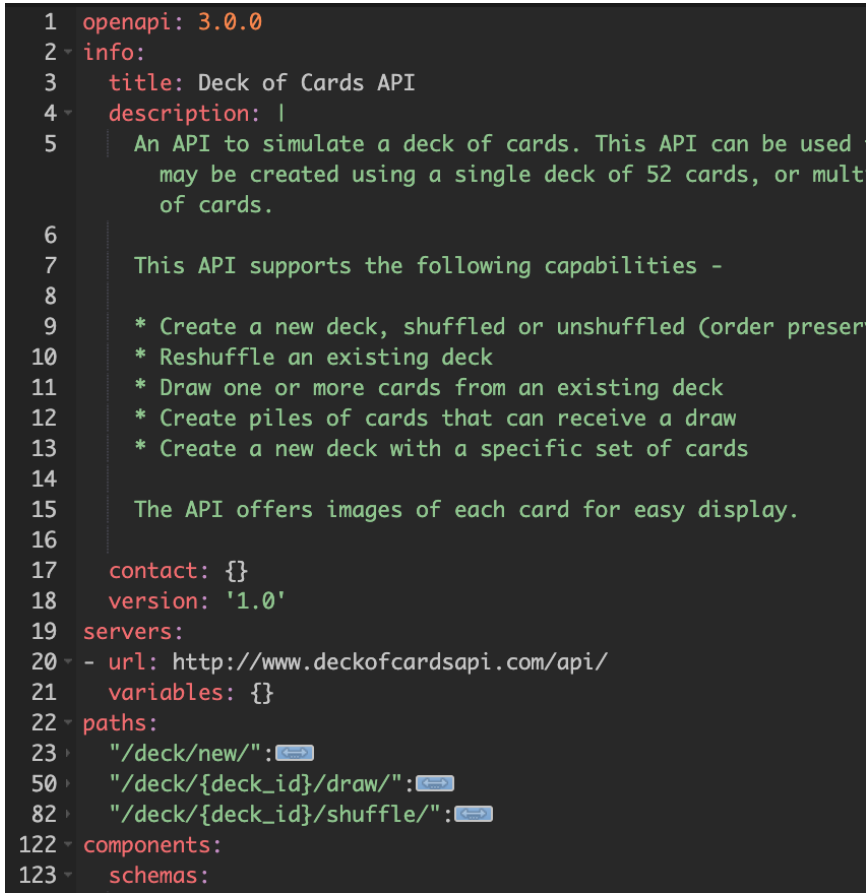
APIs as Contracts

- An application programming interface (API) specifies how software components should interact with each other.
- As such, APIs are considered **contracts between the organization providing** the API **and developers consuming** this API.
- *"if you provide information in this format, I – the API - will perform a specific action and return a result in this format".*



Formalizing API Contracts

- For every operation supported by an API, its contract describes:
  - what must be provided as input
  - what will happen
  - and what, if any, data is returned
- OpenAPI Specification (OAS) is a standard to define contracts for HTTP/REST API
- Example of OpenAPI document



```
openapi: 3.0.0
info:
  title: Deck of Cards API
  description: |
    An API to simulate a deck of cards. This API can be used
      may be created using a single deck of 52 cards, or mult
      of cards.

    This API supports the following capabilities -

    * Create a new deck, shuffled or unshuffled (order preser
    * Reshuffle an existing deck
    * Draw one or more cards from an existing deck
    * Create piles of cards that can receive a draw
    * Create a new deck with a specific set of cards

    The API offers images of each card for easy display.

  contact: {}
  version: '1.0'
servers:
- url: http://www.deckofcardsapi.com/api/
  variables: {}
paths:
  "/deck/new/":
  "/deck/{deck_id}/draw/":
  "/deck/{deck_id}/shuffle/":
components:
  schemas:
```

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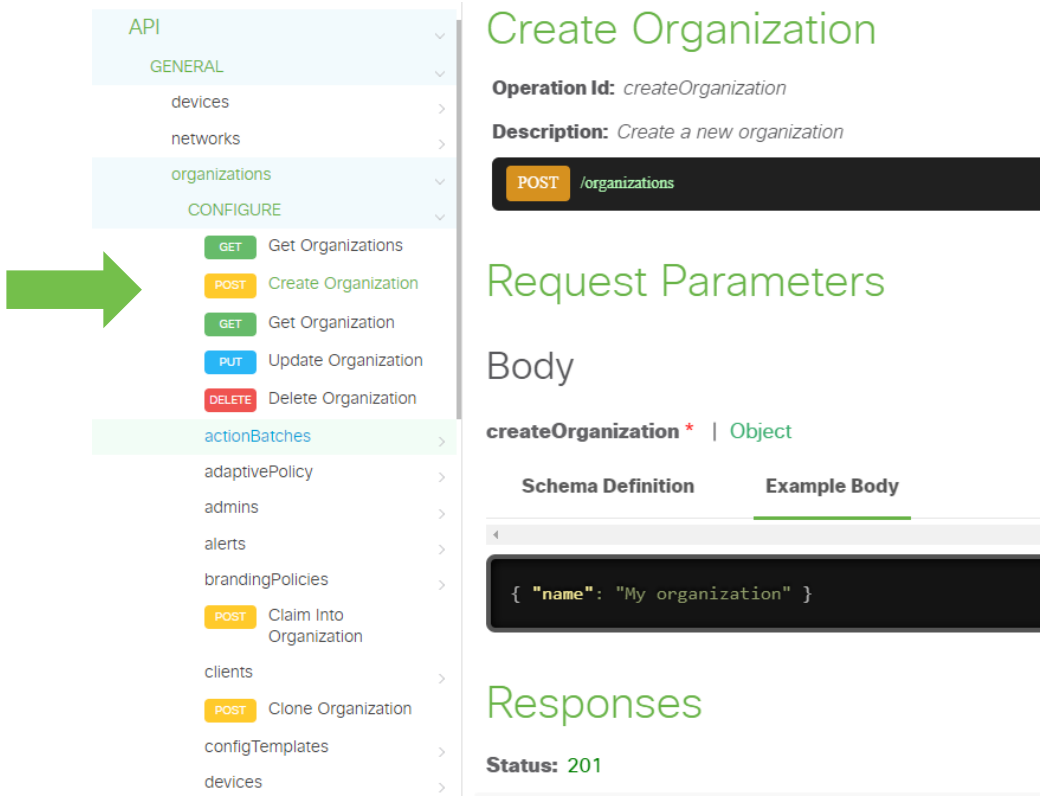
What are API Contracts

API Reference Documentation

developer.cisco.com/meraki/api-v1/#!create-organization

- Reference documentation automatically rendered from OpenAPI documents

```yaml
post:
  description: Create a new organization
  operationId: createOrganization
  parameters:
    - name: createOrganization
      in: body
      schema:
        type: object
        properties:
          name:
            type: string
            description: The name of the organization
        example:
          name: My organization
        required:
          - name
      required: true
  responses:
    '201':
      description: Successful operation
```



Get Organizations

Operation Id: *getOrganizations*

Description: *List the organizations that the user has privileges on*

GET /organizations

Responses

Status: 200

Successful operation

Schema Definition | Example Body

- array[]
  - **id:** string *Organization ID*
  - **name:** string *Organization name*
  - **url:** string *Organization URL*
  - **api:** object *API related settings*
  - **cloud:** object *Data for this organization*
  - **licensing:** object *Licensing related settings*

Parameters | Template

GET /organizations

Query Params

Headers

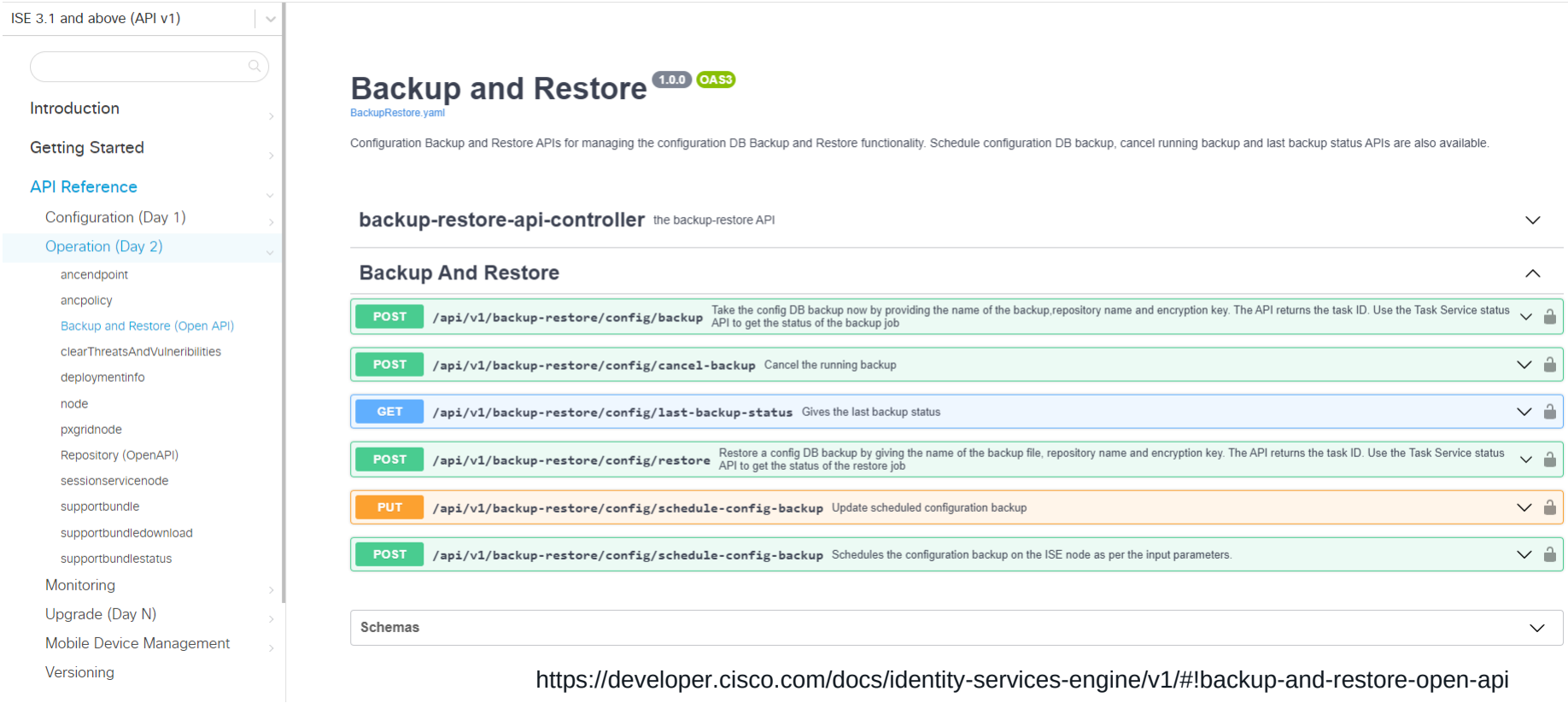
Run

Response: 200 OK

Data | Info

Copy


```
[
    {
        "id": "681155",
        "name": "DeLab",
        "url": "https://n392.meraki.com/o/49Gm_c/manage/orga
        "api": { "enabled": true },
        "licensing": { "model": "per-device" },
        "cloud": {
```



https://developer.cisco.com/docs/identity-services-engine/v1/#!backup-and-restore-open-api

Why
API Contracts Matter

Who you are	Benefits blogs.cisco.com/developer/worldclassapis01
IT Pro or Application Developer consuming APIs	• OAS to **discover** the capabilities of an API • OAS to **automatically** generate **client code** for your preferred language • **OAS as** a pivot format to import/export API definitions across **tools**
Engineering group publishing internal or external-facing APIs **BRKDEV-2249** Friday 9:15AM	• OAS to **define the capabilities** offered for your API • OAS to publish low-level **SDKs** • OAS to publish accurate and interactive **documentation** • OAS to automate raw API **Changelogs** • **Authoring tools** to initiate/edit OAS documents (Design-First) • **Source code annotations** to generate OAS documents (Code-First) • **OAS linters** to automate design reviews and adoption of REST Guidelines • Static & dynamic **analysis of API Security issues** including OWASP Top 10
Security and Compliance Officers overseeing every APIs	• OAS to maintain an **inventory of** an organization's **APIs** • Analysis of OAS documents to **identify breaking changes** and **ensure backward compatibility** of existing API Contracts • OAS to **ensure compliance** of new releases along **CI/CD pipelines** • OAS to **identify** zombie & shadow **operations** via live traffic observations

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Why API Contracts Matter

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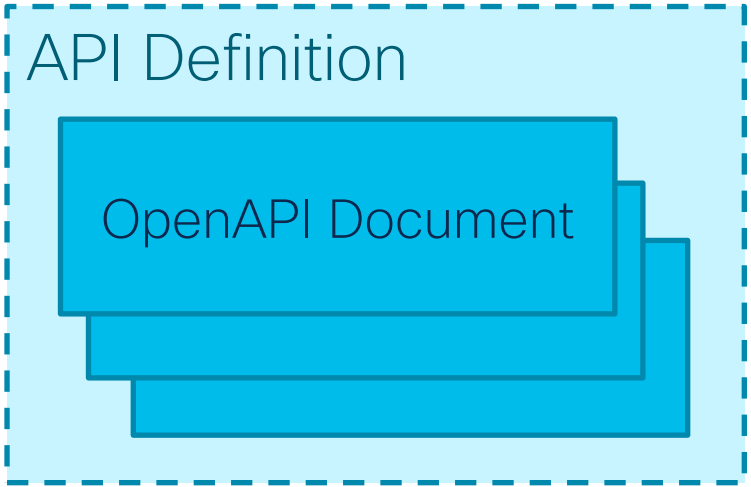
What is an API Contract



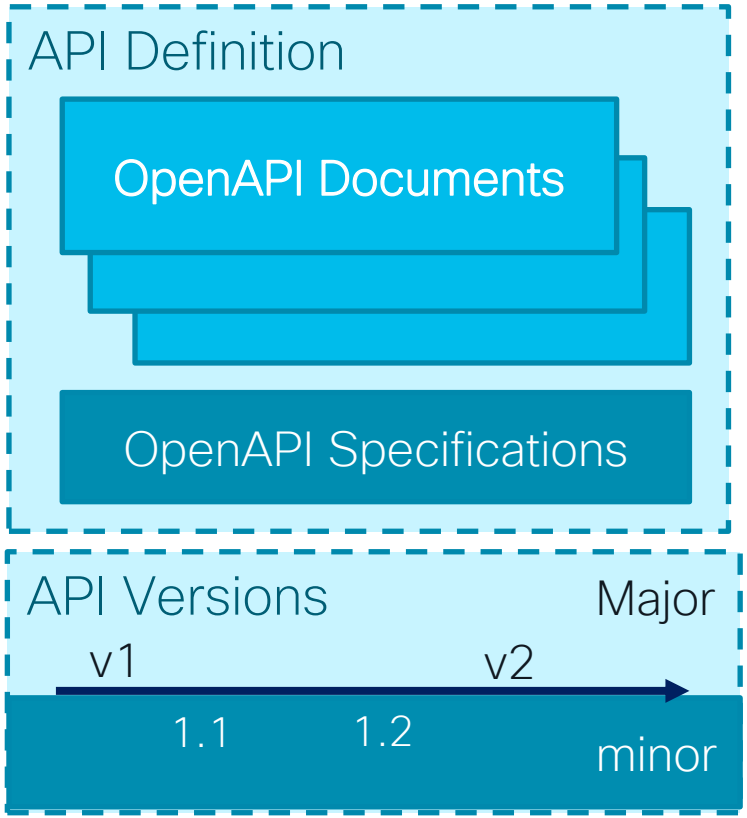
An **API Definition** describes the full contract for an API.

An **OpenAPI document** contains the description of the full set or a subset of the API features.

OpenAPI Specifications
(OAS)

The **OpenAPI Specification** is a programming language-agnostic standard used to describe the contract for HTTP/REST APIs

API Contract: Definition and Lifecycle for an API



An **API Definition** describes all the operations exposed by an API including incoming/outgoing payloads.

An **OpenAPI document** contains the description of the full set or a subset of the API features.

The **OpenAPI Specification** is a standard used to describe contracts for HTTP/REST APIs

API Changelog
Backward Compatibility across minor versions

API Guidelines

- An API is a **network programmatic interface that a product** – may be bare metal hardware, or virtual machine or software – AND – may be cloud or on-premises – **publishes**.
- It has **versions** – it's the API lifecycle
- **For every update, an API would publish its contract** as one or multiple OpenAPI documents for download or online browsing.
- Every API version provides a documentation which includes authentication instructions, developer guides, code samples and reference documentation… and an API changelog.

OAS Document Lifecycle

1. Create initial OAS document

Product Manager

OAS Document draft 1

2. Expand OAS document with payload and errors

Engineering Lead

OAS Document draft 2

3. Enrich OAS documents with descriptions and examples

Tech Writer

OAS Document draft …

4. Integrate with API documentation publishing tool

developer.cisco.com

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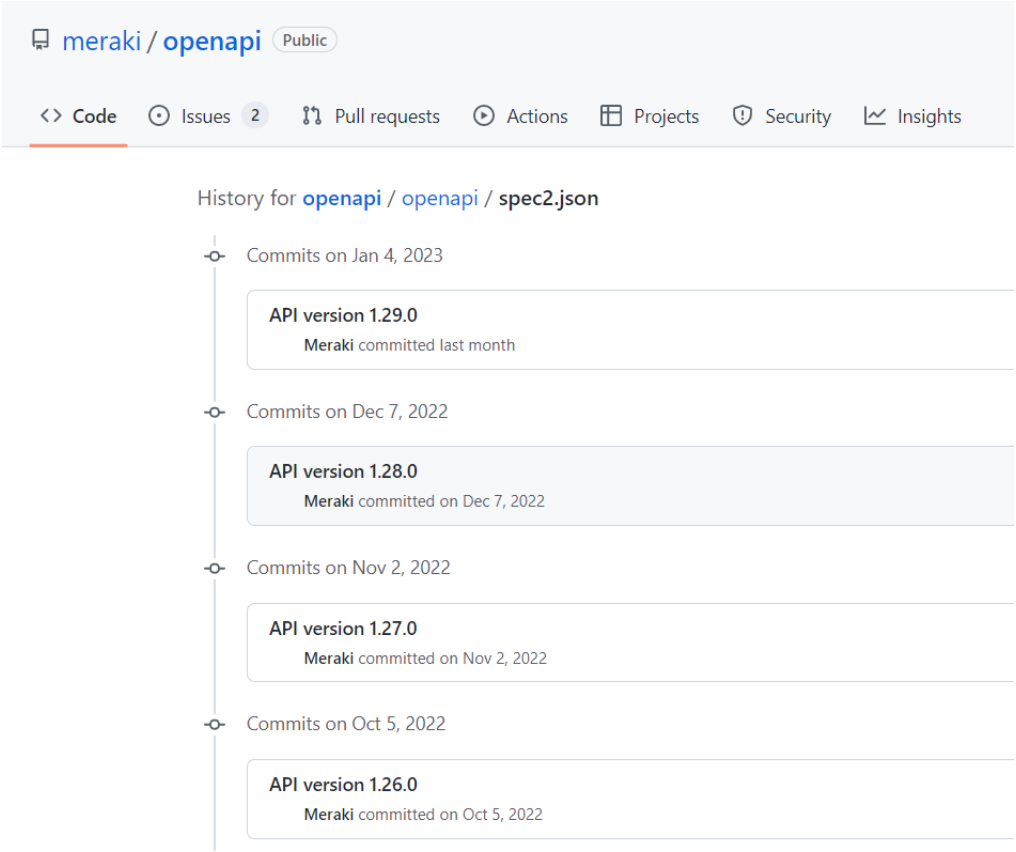
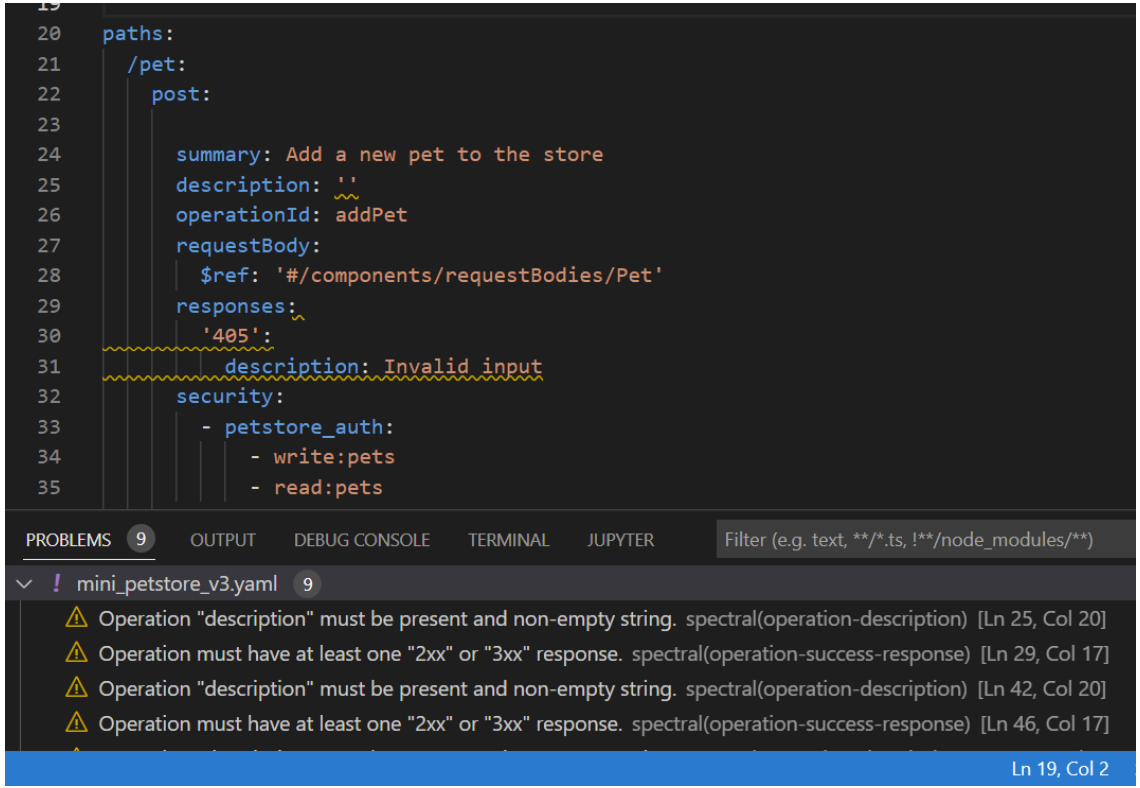


OAS Documents Static Analysis

Detecting Quality or Security Faults



Spectral, an Open Source JSON/YAML Linter

Stoplight

Added: GET /catalogue/personalize

Modified: GET /catalogue/{id} Breaking

Parameters:

Modified: **id** in **path**

catalogue id

Code Diff

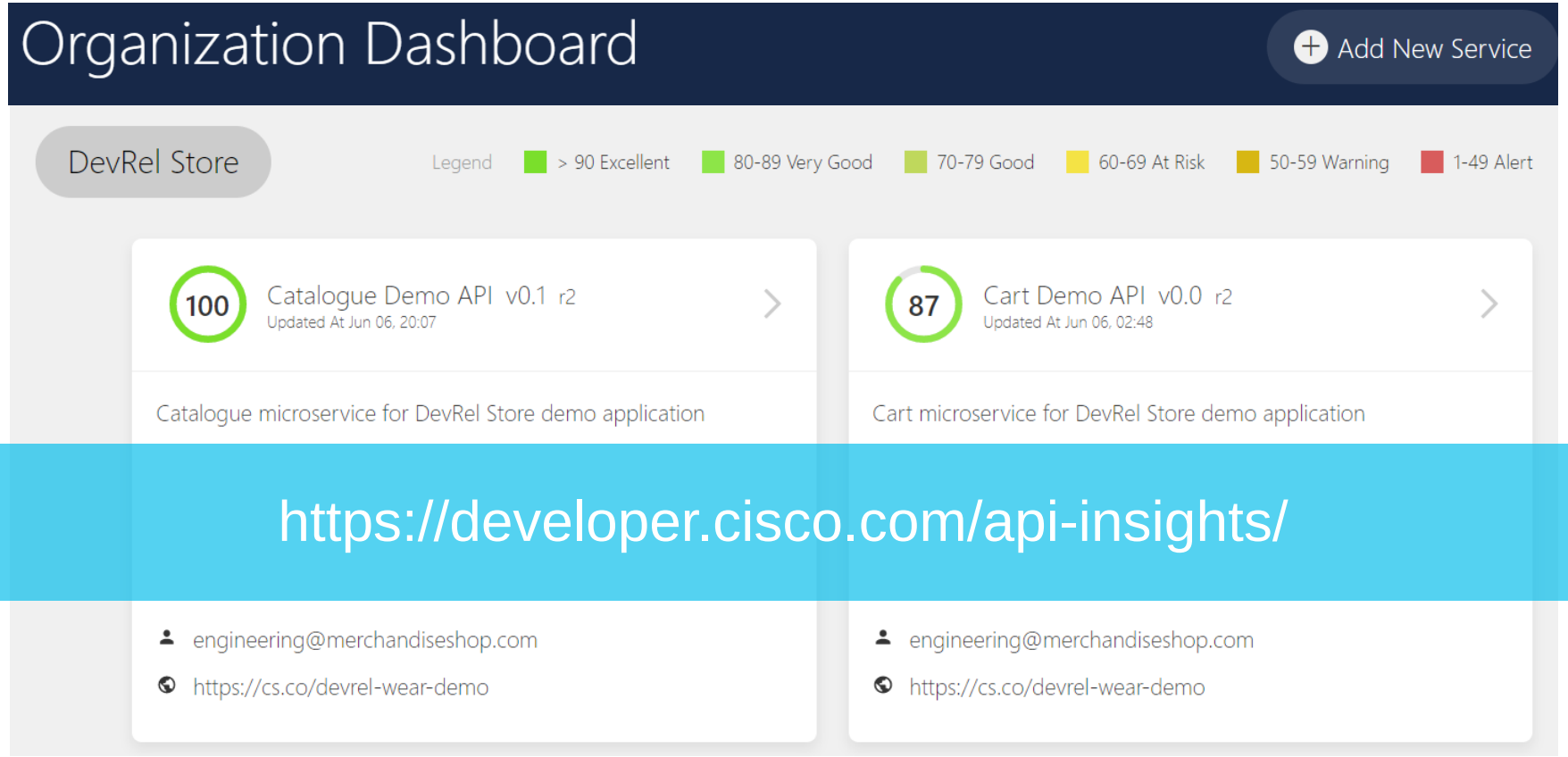
```
{
    "description": "get",
    "operationId": "Get-an-item",
    "parameters": [
        {
            "description": "catalogue id",
            "in": "path",
            "maxLength": 255,
            "minLength": 1,
            "name": "id",
            "pattern": "[^/]*",
            "required": true,
            "type": "string"
        }
    ],
```

```
{
    "description": "get",
    "operationId": "Get-an-item",
    "parameters": [
        {
            "description": "catalogue id",
            "format": "double",
            "in": "path",
            "maximum": 255,
            "minimum": 1,
            "name": "id",
            "required": true,
            "type": "number"
        }
    ],
```

API Changelog

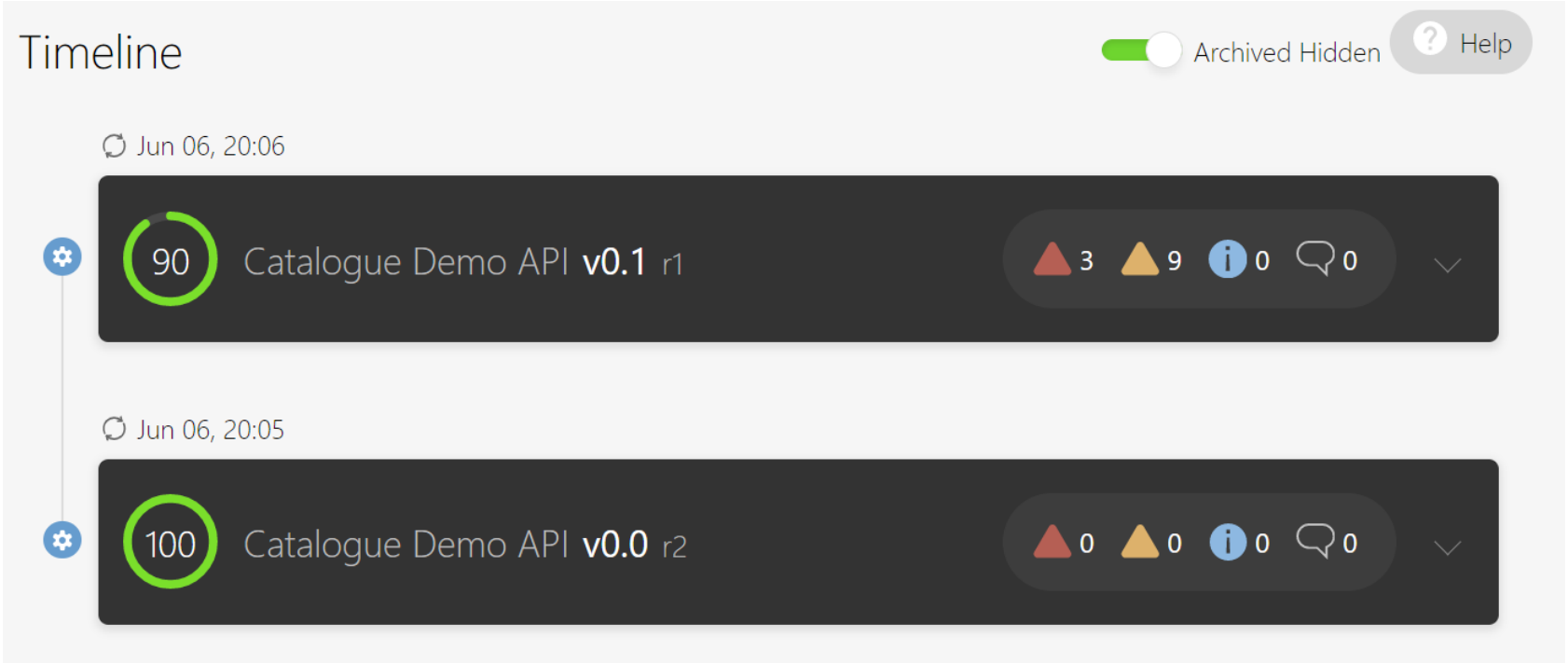
- one operation added
- one breaking change detected

API Insights



https://developer.cisco.com/api-insights/

Lifecycle of OpenAPI Documents



Analyzing spec v0.1 r1

for compliance with ☑ Completeness ☑ REST Guidelines ☑ Security ☑ Inclusive Language

3 Error 9 Warning 0 Info 0 Hint

API Insights Demo
DevNet Zone
Meet The Developer

Analyzer	Severity	Findings	Recommendation
Completeness	Error	Some operations do not define errors. (Line 483)	Please add an error status code for the items identified.
REST Guidelines	Error	A 401 status code is returned when authentication fails. (Line 483)	Please add a 401 status code for the ite ms identified.
REST Guidelines	Error	A 403 status code is returned if a consumer is not authorized to access an operation. (Line 483)	Please add a 403 status code for the ite ms identified.
Inclusive Language	Warning	The underlying assumption of the whitelist/blacklist metaphor is that white = good and black = bad. Because colors in and of themselves have no predetermined meaning, any meaning we assign to them is cultural: for example, the color red in many Southeast Asian countries is lucky, and is often associated with events like marriages, whereas the color white carries the same connotations in many European countries. In the case of whitelist/blacklist, the terms originate in the publishing industry – one dominated by the USA and England, two countries which participated in slavery and which grapple with their racist legacies to this day. (Line 442)	`blacklist` may be insensitive, use `denyli st`, `blocklist`, `exclusion list` instead

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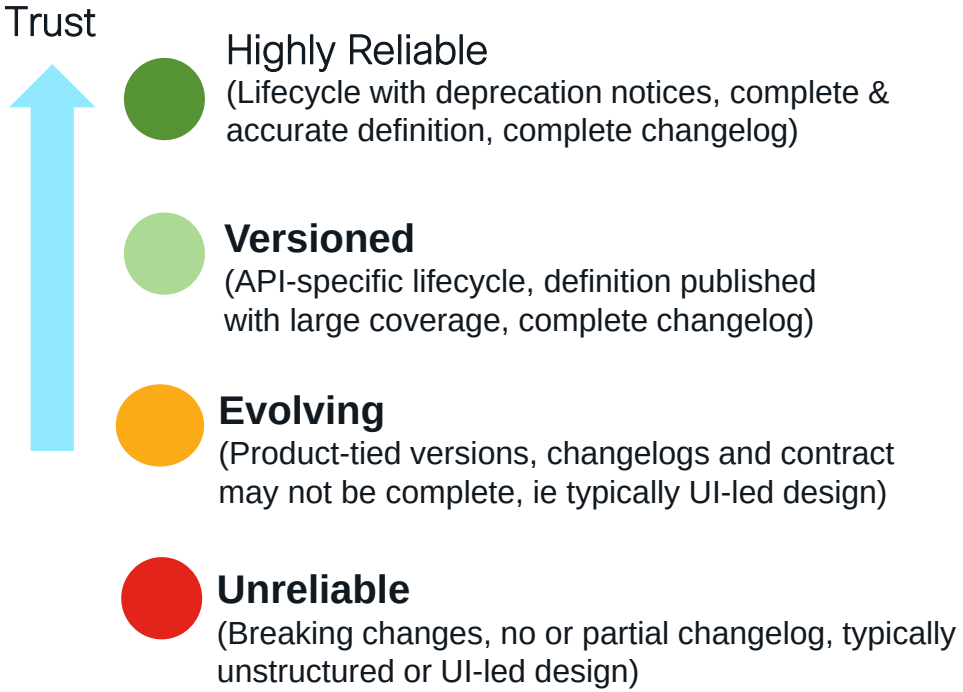
Evaluating the Quality of API Contracts



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