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Let's go

#CiscoLive

The bridge to possible

API Middle-tier for Dummies, or How to Make your UI Developers Happy by Stitching all your APIs Together.

Ramses Smeyers, Distinguished Engineer – CX TAC

DEVNET-2158

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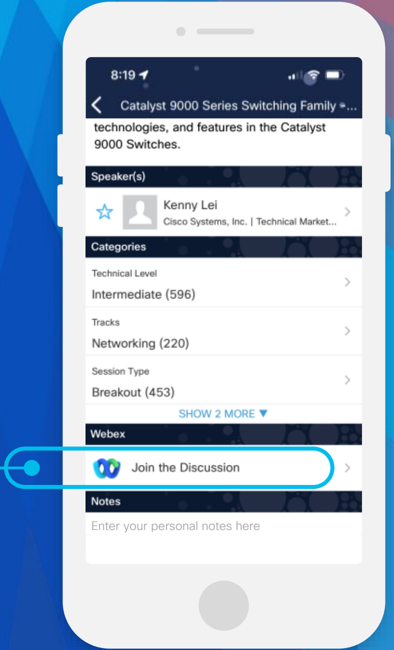
8:19

Catalyst 9000 Series Switching Family ...

technologies, and features in the Catalyst 9000 Switches.

Speaker(s)

Kenny Lei
Cisco Systems, Inc. | Technical Market...

Categories

Technical Level	Intermediate (596)
Tracks	Networking (220)
Session Type	Breakout (453)

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Notes

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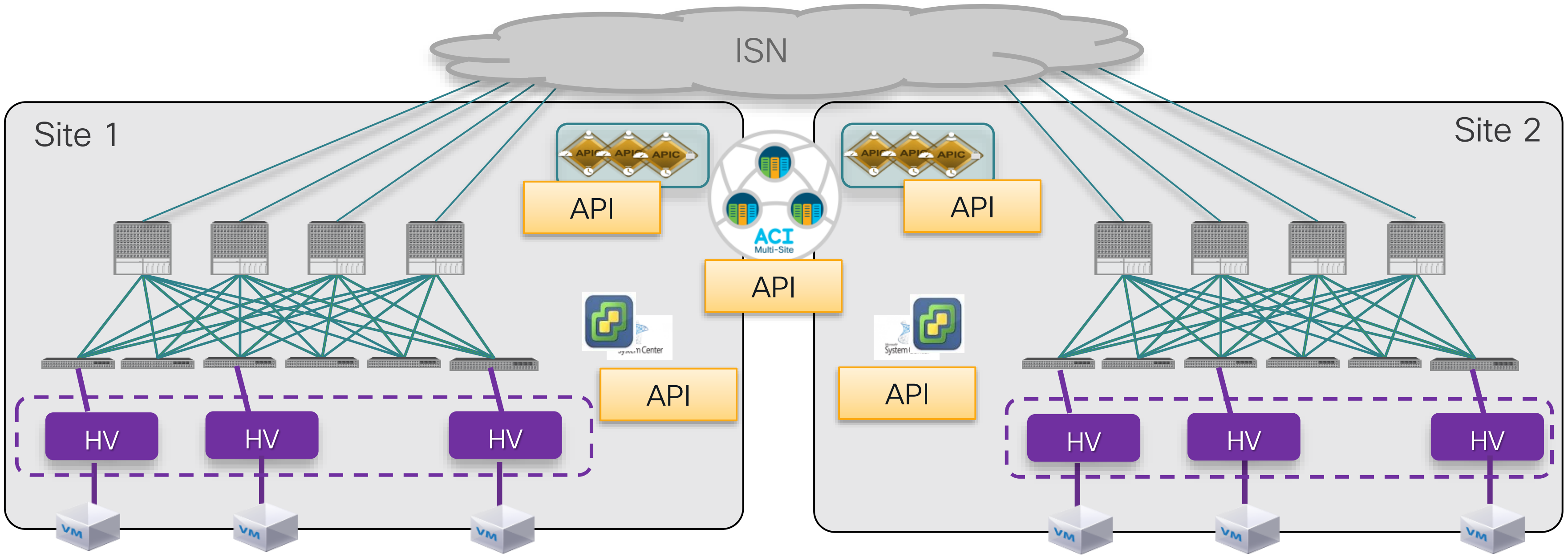
Agenda

- Why
- Start small
- Introducing Flask
- Our use-case
- End-2-end demo

Average DC landscape



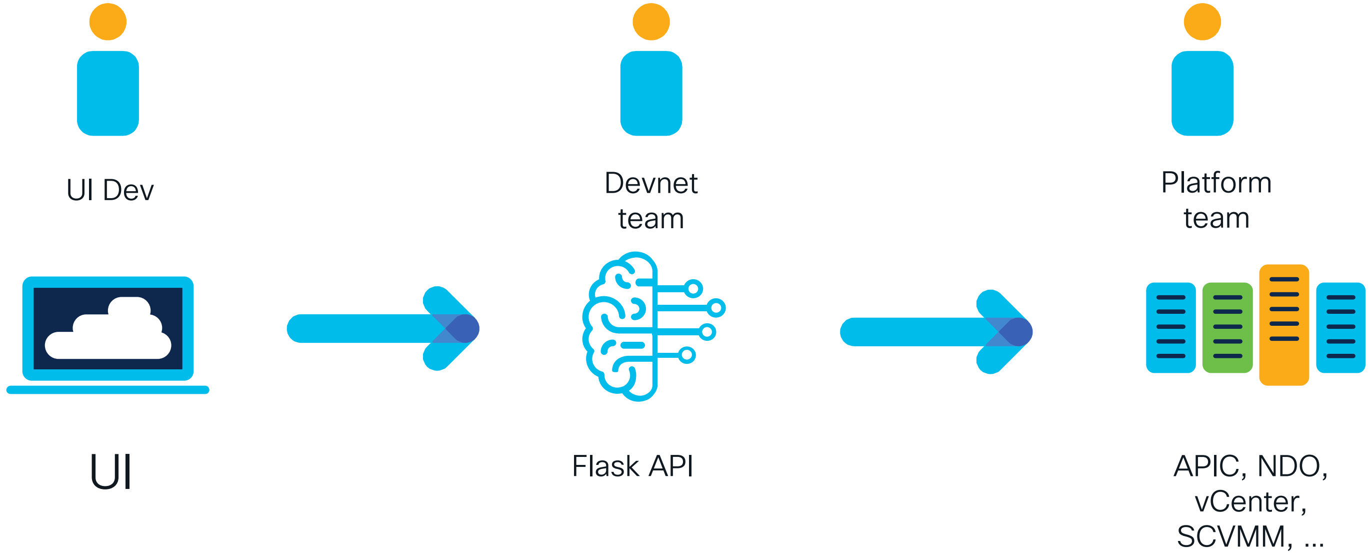
Why

Automation options

- Cisco Intersight Cloud Orchestrator
- NSO
- Ansible Automation Platform
- Terraform Cloud
- ....
- Python

Our session will focus on this

A possible option – manage an ACI switch



/api/v0/node

Or

/api/v0/nodes.html

/api/node/mo/uni/controller/nodeidentpol/nodep-{serial}.json“
+
Platform auth

Start small

What do you want to automate ?

- Ask the “Platform team’ the re-occurring change requests
  - What is repetitive
  - What is information intensive
- Check Product audit logs for re-occurring changes

Document

- Expose amazing documentation
  - Pref. in https://spec.openapis.org/oas/v3.1.0.html format
- Auto-generate your API spec

Introducing flask

Flask

- Python based API
- Self-documenting
  - Auto generates OpenAPI spec
- Build in validators
  - Response marshalling
  - Request Parsing
- Simple yet elegant

- Lot's of other Flask based API's out there, but we'll use Restx

Let’s get it started

```
from flask import Flask
from flask_restx import Resource, Api

app = Flask(__name__)
api = Api(app)

@api.route('/hello')
class HelloWorld(Resource):
    def get(self):
        return {'hello': 'world’}

api.add_resource(HelloWorld, "/hello", endpoint="hello world")


if __name__ == '__main__':
    app.run(debug=True)
```

```
$ python3 api.py
 * Serving Flask app 'api'
 * Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on http://127.0.0.1:5000
Press CTRL+C to quit
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 416-240-977
```

```
$ curl http://127.0.0.1:5000/hello
{
   "hello": "world"
}
```

Documentation

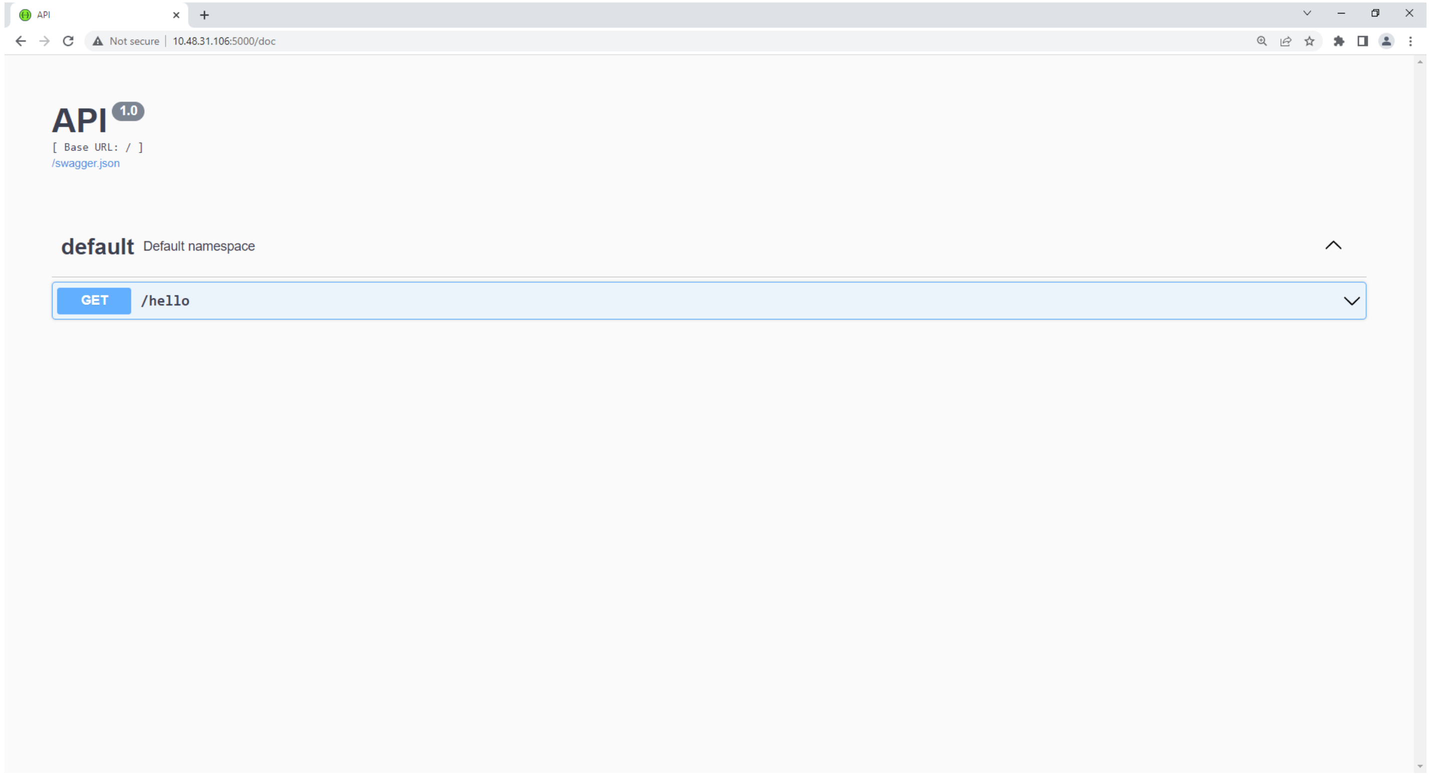
```
$ python3 api.py
 * Serving Flask app 'api'
 * Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a
production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://10.48.31.106:5000
Press CTRL+C to quit
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 416-240-977
10.55.17.89 - - [23/Jan/2023 16:07:56] "GET /hello HTTP/1.1" 200 -
```

```
from flask import Flask
from flask_restx import Resource, Api

app = Flask(__name__)
api = Api(app,doc="/doc")

class HelloWorld(Resource):
    def get(self):
        return {'hello': 'world'}

api.add_resource(HelloWorld, "/hello", endpoint="hello world")


if __name__ == '__main__':
    app.run(debug=True,host="0.0.0.0")
```

Auto generate docs

Listen on all IP addresses → only use for DEV

Documentation – swagger UI



API 1.0

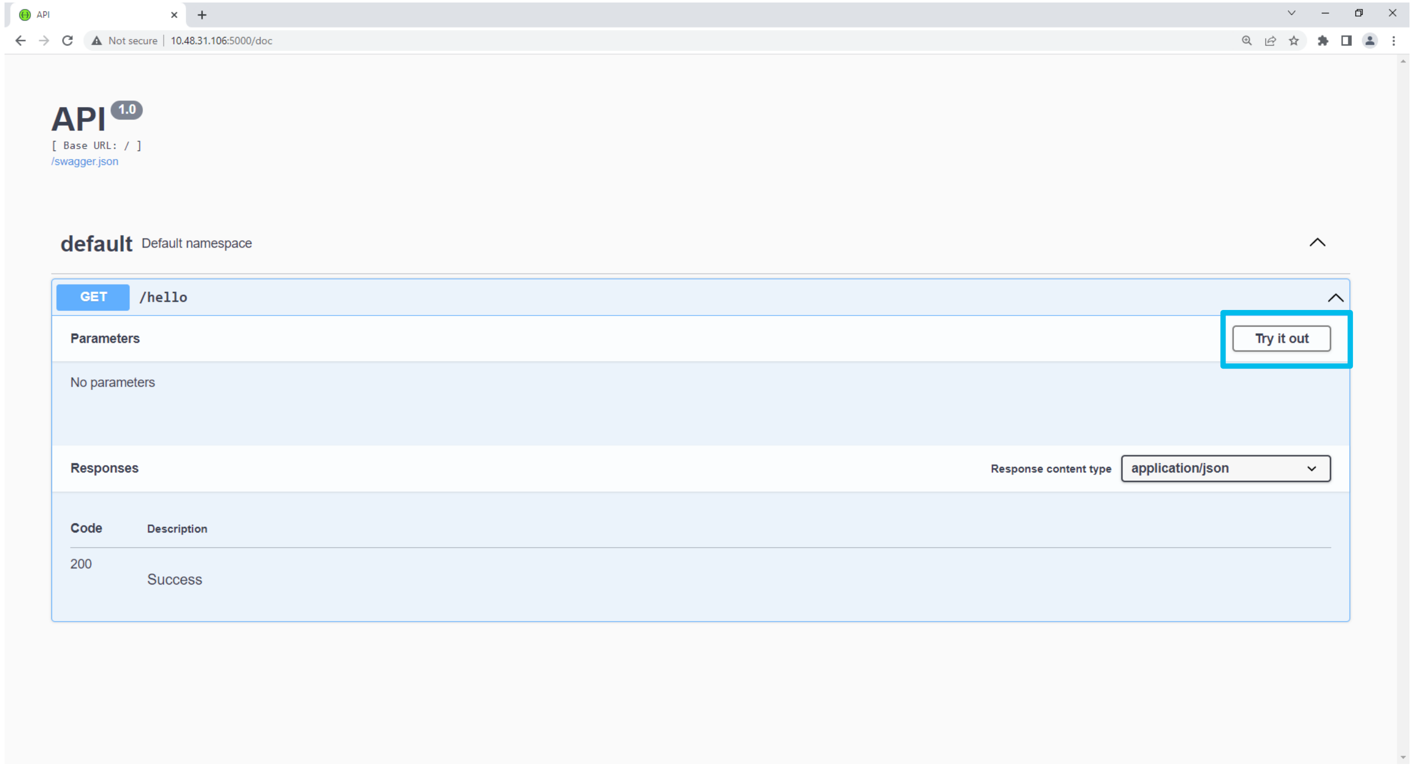
[Base URL: /]

/swagger.json

default Default namespace

GET /hello

Documentation – swagger UI


API

Not secure | 10.48.31.106:5000/doc

API 1.0

```
[ Base URL: / ]
```

/swagger.json

default Default namespace

GET `/hello`

Parameters

Try it out

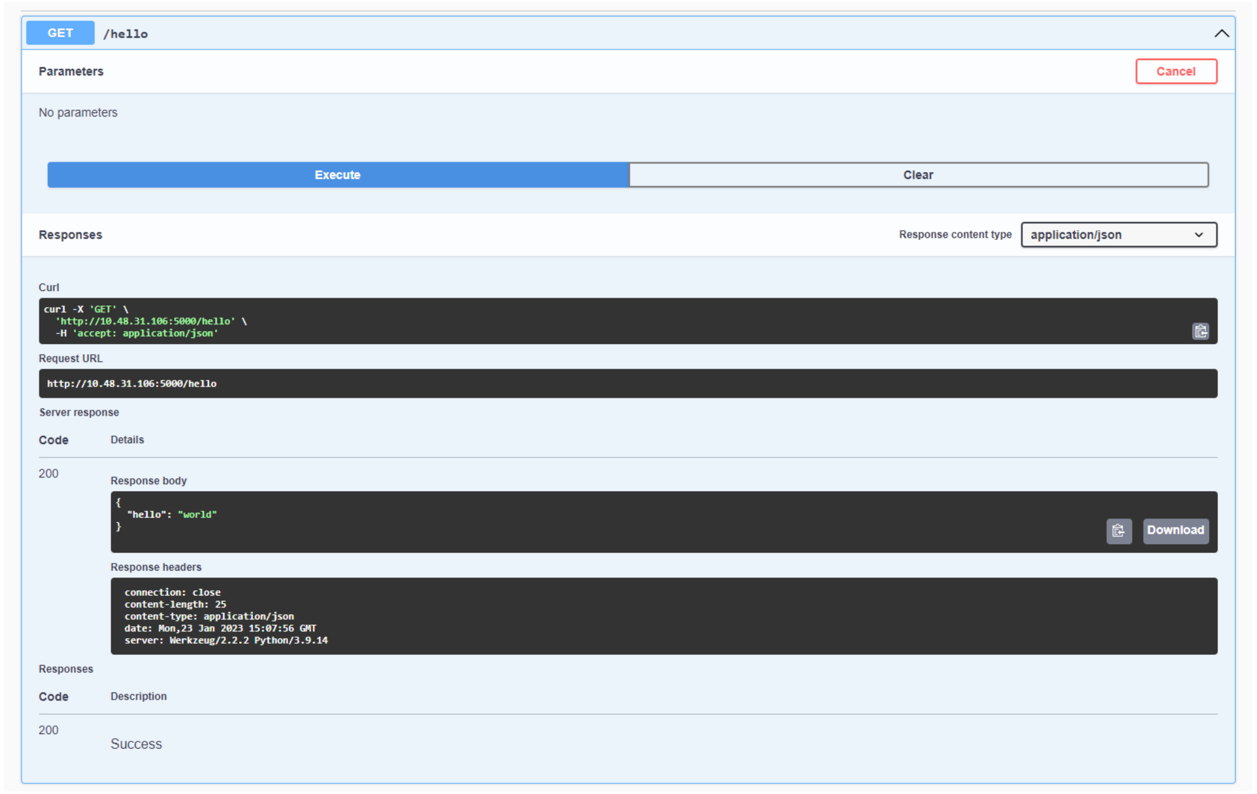
No parameters

Responses

Response content type: application/json

Code	Description
200	Success

Swagger UI – Try it out



No parameters

Curl

```
curl -X 'GET' \
  'http://10.48.31.106:5000/hello' \
  -H 'accept: application/json'
```

Request URL

```
http://10.48.31.106:5000/hello
```

Server response

Code	Details
200	Response body

```
{
  "hello": "world"
}
```

Response headers

```
connection: close
content-length: 25
content-type: application/json
date: Mon,23 Jan 2023 15:07:56 GMT
server: Werkzeug/2.2.2 Python/3.9.14
```

Responses

Code	Description
200	Success

Request Parsing

- reqparse is modelled as argparse
  - handles input validation
- auto generates documentation when used in Flask

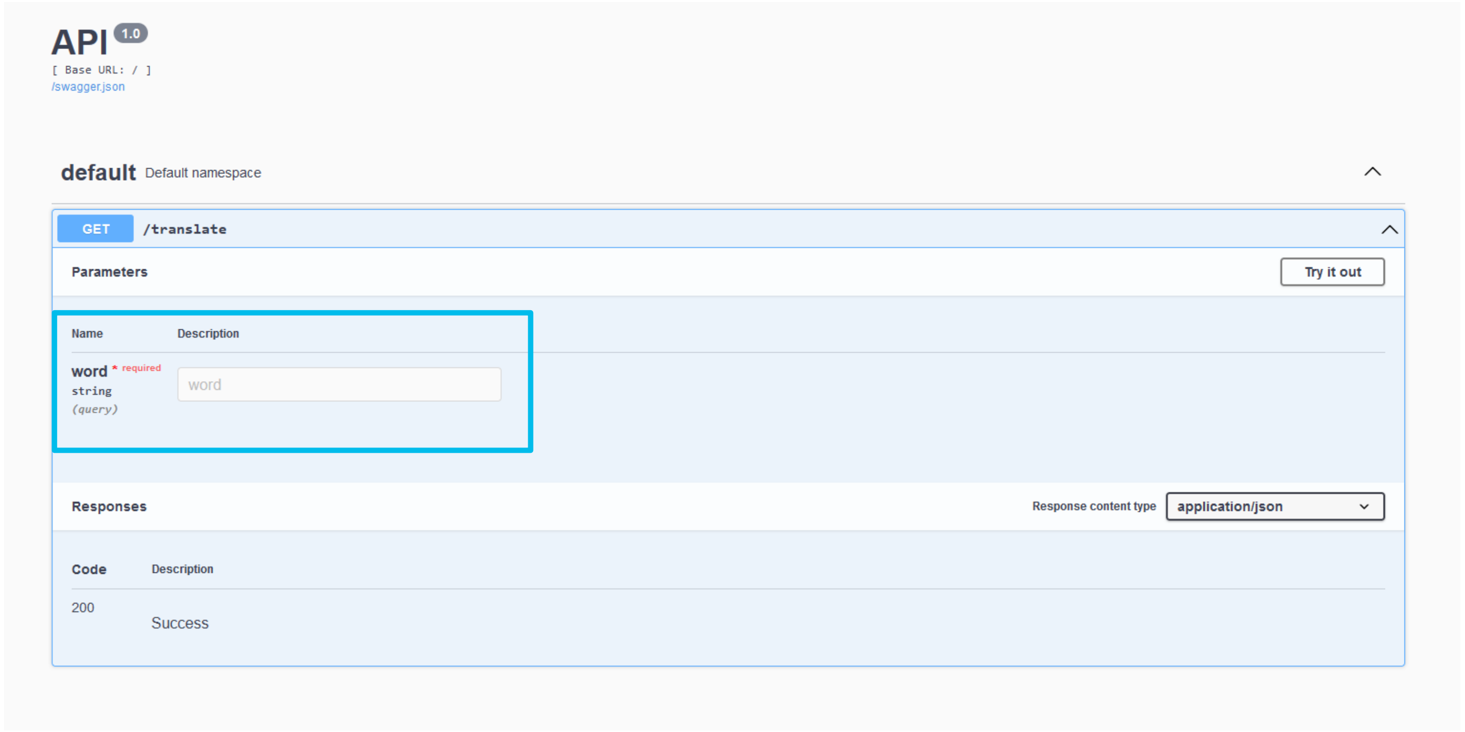
API Expect – control input

```
from flask import Flask
from flask_restx import Resource, Api, reqparse

app = Flask(__name__)
api = Api(app,doc="/doc")

translate_parser= reqparse.RequestParser(bundle_errors=True)
translate_parser.add_argument("word", required=True, type=str)


class Translate(Resource):
    @api.expect(translate_parser, validate=True)
    def get(self):
        args = translate_parser.parse_args()
        word = args["word"]

        dictionary = {
                    "car": "auto",
                    "house": "huis"
                    }

        return {'translated': dictionary[word]}

api.add_resource(Translate, "/translate", endpoint="Translate")


if __name__ == '__main__':
    app.run(debug=True,host="0.0.0.0")
```

Configure request parser

Enforce parser

API Expect – control input – swagger



API 1.0
[Base URL: /]
/swagger.json

default Default namespace

GET /translate

Parameters

Name	Description
word * required string *(query)*	word

Responses

Response content type: application/json

Code	Description
200	Success

Response marshalling

- Renders response data
  - Enforces strict model
- Auto generates documentation

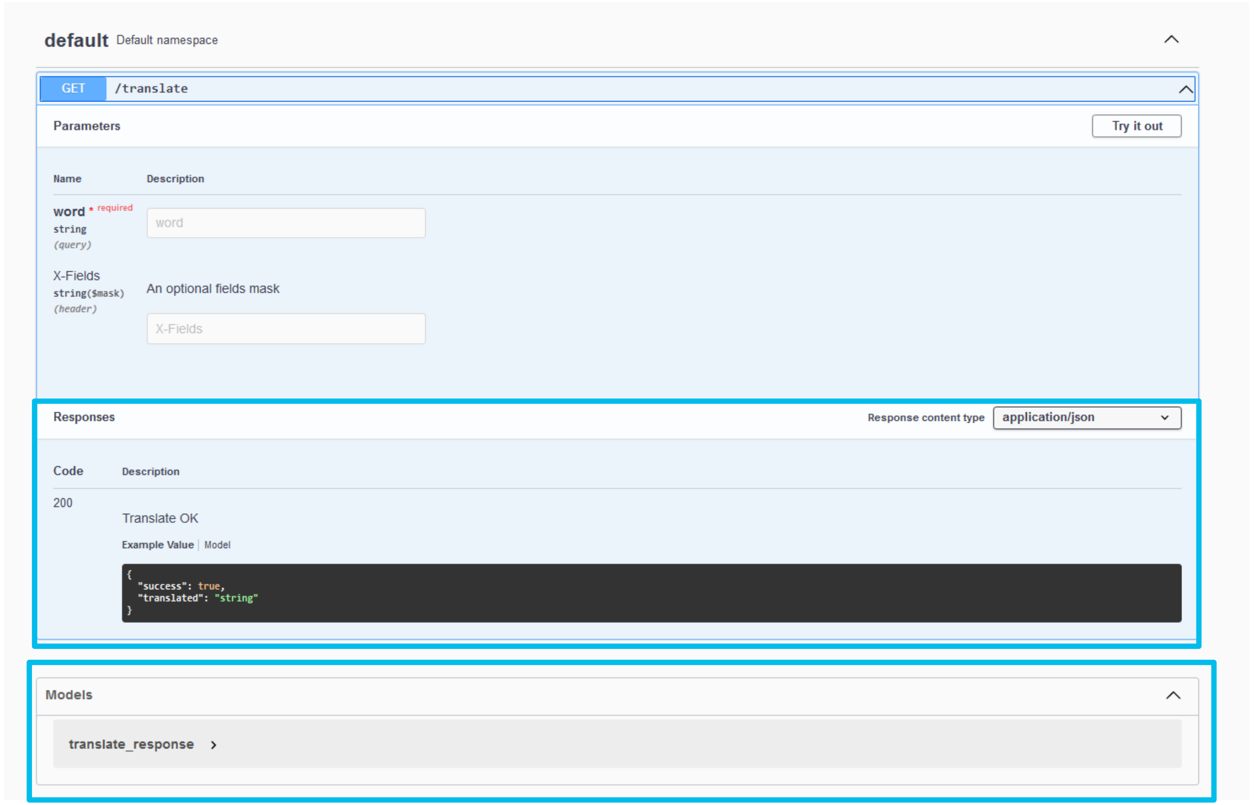
API Marshal – control output

```
from flask import Flask
from flask_restx import Resource, Api, reqparse,fields,marshal

app = Flask(__name__)
api = Api(app,doc="/doc")

translate_parser= reqparse.RequestParser(bundle_errors=True)
translate_parser.add_argument("word", required=True, type=str)

translate_response_model = api.model(
    "translate_response",
    {
        "success": fields.Boolean(required=True, choices=(False, True),default=True),
        "translated": fields.String(required=True),
    },
)

class Translate(Resource):
    @api.marshal_with(translate_response_model, code=200, description="Translate OK")
    @api.expect(translate_parser, validate=True)
    def get(self):
        args = translate_parser.parse_args()
        word = args["word"]

        dictionary = {
                    "car": "auto",
                    "house": "huis"
                    }

        return {'translated': dictionary[word]}

api.add_resource(Translate, "/translate", endpoint="Translate")

if __name__ == '__main__':
    app.run(debug=True,host="0.0.0.0")
```

Create response model

Enfore model

API Marshal – control output - swagger



default Default namespace

GET /translate

Parameters — Try it out

Name	Description
word * required string *(query)*	word
X-Fields string($mask) *(header)*	An optional fields mask X-Fields

Responses — Response content type: application/json

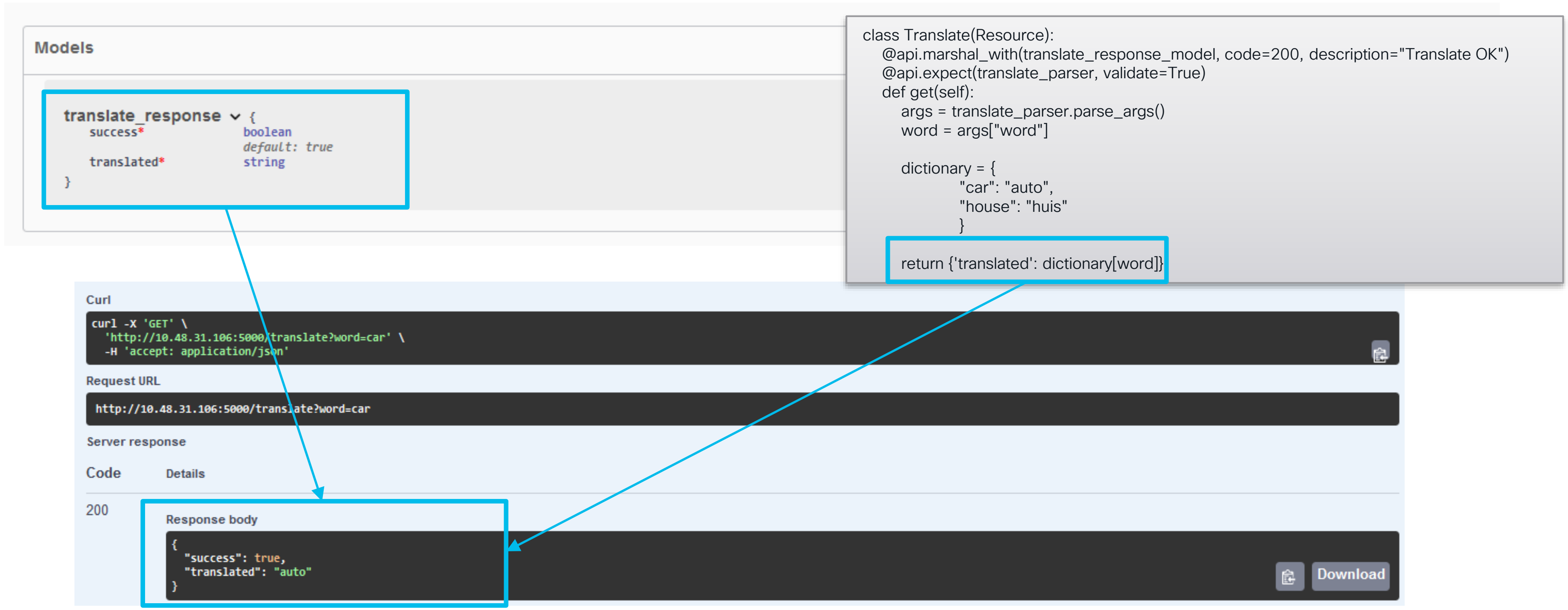
Code	Description
200	Translate OK Example Value | Model

```
{
  "success": true,
  "translated": "string"
}
```

Models

translate_response ›

API Marshal – control output - swagger



Models

```
translate_response ⌄ {
   success*              boolean
                         default: true
   translated*           string
}
```

```
class Translate(Resource):
    @api.marshal_with(translate_response_model, code=200, description="Translate OK")
    @api.expect(translate_parser, validate=True)
    def get(self):
        args = translate_parser.parse_args()
        word = args["word"]

        dictionary = {
                    "car": "auto",
                    "house": "huis"
                    }

        return {'translated': dictionary[word]}
```

Curl

```
curl -X 'GET' \
  'http://10.48.31.106:5000/translate?word=car' \
  -H 'accept: application/json'
```

Request URL

```
http://10.48.31.106:5000/translate?word=car
```

Server response

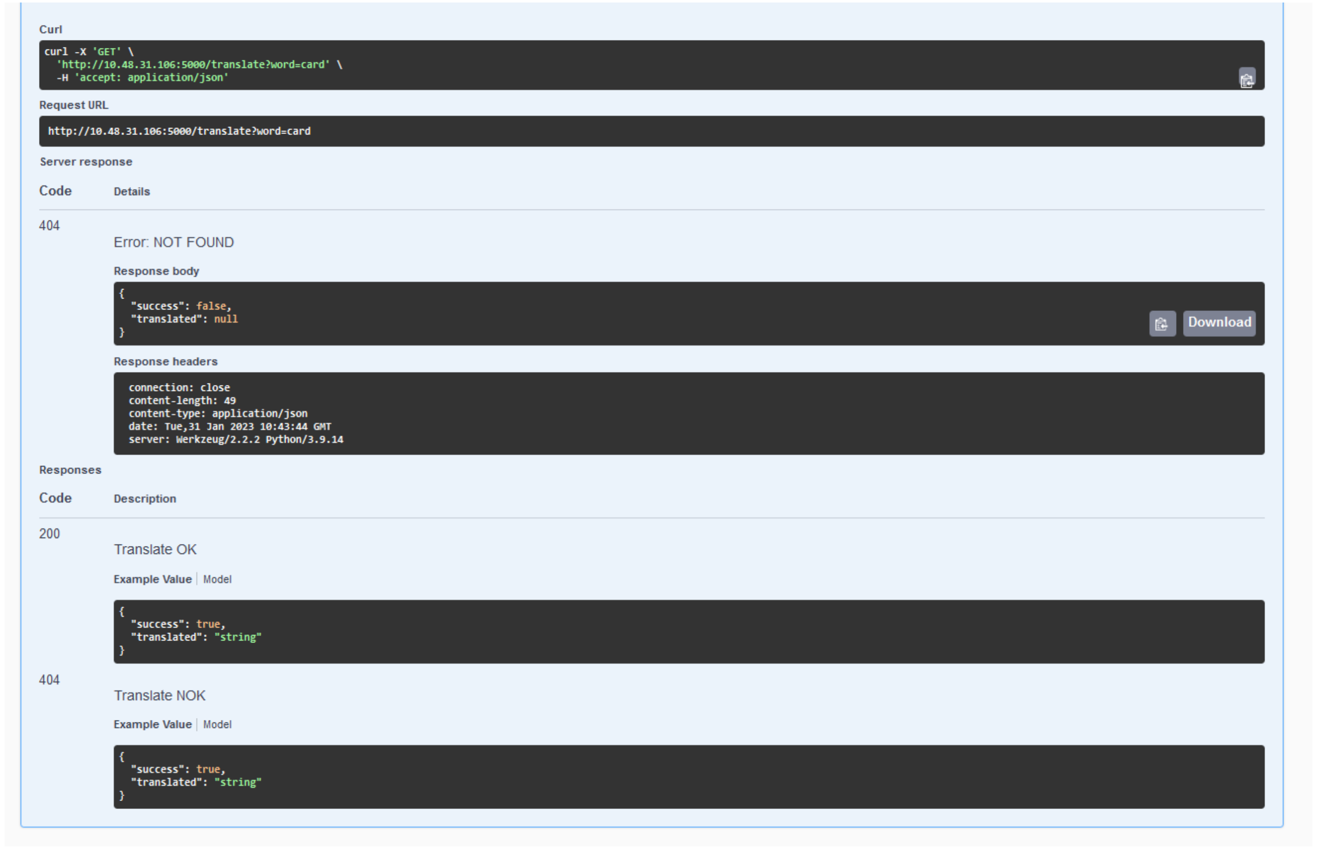
Code	Details
200	Response body

```
{
  "success": true,
  "translated": "auto"
}
```

API Marshal – there's more then 200

```
class Translate(Resource):
    @api.marshal_with(translate_response_model, code=200, description="Translate OK")
    @api.marshal_with(translate_response_model, code=404, description="Translate NOK")
    @api.expect(translate_parser, validate=True)
    def get(self):
        args = translate_parser.parse_args()
        word = args["word"]

        dictionary = {
                    "car": "auto",
                    "house": "huis"
                    }

        if word in dictionary:
            return {'translated': dictionary[word]}
        else:
            return {'success': False }, 404
```

API Marshal – there’s more then 200 - swagger



Curl

```
curl -X 'GET' \
  'http://10.48.31.106:5000/translate?word=card' \
  -H 'accept: application/json'
```

Request URL

```
http://10.48.31.106:5000/translate?word=card
```

Server response

Code	Details
404	Error: NOT FOUND

Response body

```
{
  "success": false,
  "translated": null
}
```

Response headers

```
 connection: close
 content-length: 49
 content-type: application/json
 date: Tue,31 Jan 2023 10:43:44 GMT
 server: Werkzeug/2.2.2 Python/3.9.14
```

Responses

Code	Description
200	Translate OK
404	Translate NOK

200 — Translate OK

Example Value | Model

```
{
  "success": true,
  "translated": "string"
}
```

404 — Translate NOK

Example Value | Model

```
{
  "success": true,
  "translated": "string"
}
```

What about POST ? – quick code-refactor

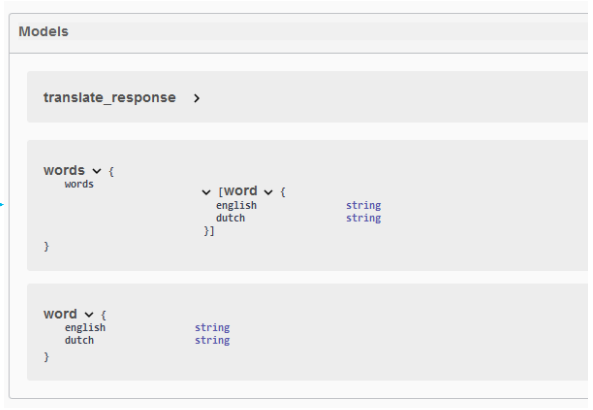
```
from flask import Flask
from flask_restx import Resource, Api, reqparse, fields, marshal

app = Flask(__name__)
api = Api(app, doc="/doc")

translate_parser = reqparse.RequestParser(bundle_errors=True)
translate_parser.add_argument("word", required=True, type=str)

translate_response_model = api.model(
    "translate_response",
    {
        "success": fields.Boolean(required=True, choices=(False, True), default=True),
        "translated": fields.String(required=True),
    },
)

dictionary = [
    {"english": "car", "dutch": "auto"},
    {"english": "house", "dutch": "huis"},
]
```

```
class Translate(Resource):
    @api.marshal_with(translate_response_model, code=200, description="Translate OK")
    @api.marshal_with(translate_response_model, code=404, description="Translate NOK")
    @api.expect(translate_parser, validate=True)
    def get(self):
        args = translate_parser.parse_args()
        word = args["word"]

        search = next((item for item in dictionary if item["english"] == word), False)
        if search:
            return {"translated": search["dutch"]}
        else:
            return {"success": False}, 404

api.add_resource(Translate, "/translate", endpoint="Translate")

if __name__ == "__main__":
    app.run(debug=True, host="0.0.0.0")
```

What about POST ? – an example

```
word_add_parser = reqparse.RequestParser(bundle_errors=True)
word_add_parser.add_argument("english", required=True, type=str)
word_add_parser.add_argument("dutch", required=True, type=str)

word_model = api.model(
    "word",
    {
        "english": fields.String(),
        "dutch": fields.String(),
    },
)

words_response_model = api.model(
    "words", {"words": fields.List(fields.Nested(word_model))}
)
```

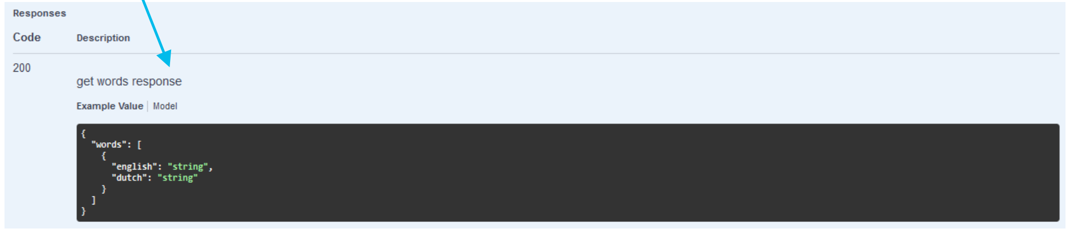
```
class Words(Resource):
    @api.expect(word_add_parser, validate=True)
    def post(self):
        args = word_add_parser.parse_args()
        english = args["english"]
        dutch = args["dutch"]

        dictionary.append({"english": english, "dutch": dutch})

        return

    @api.marshal_with(words_response_model, code=200, description="get words response")
    def get(self):
        return {"words": dictionary}

api.add_resource(Words, "/words", endpoint="Words")
```



Models

translate_response ›

```
words ⌄ {
    words
                  ⌄ [word ⌄ {
                     english             string
                     dutch               string
                  }]
}

word ⌄ {
    english              string
    dutch                string
}
```



Responses

Code	Description
200	get words response

Example Value | Model

```
{
  "words": [
    {
      "english": "string",
      "dutch": "string"
    }
  ]
}
```

Our UI developper gets full insights into the data returned by our API endpoint without having to try the API

Marshaling is nice

```
dictionary = [
    {"english": "car", "dutch": "auto"},
    {"english": "house", "dutch": "huis"},
]
```

```
return {"words": dictionary}
```

```
word_model = api.model(
    "word",
    {
        "english": fields.String(),
        "dutch": fields.String(),
    },
)
```

```
{
  "words": [
    {
      "english": "car",
      "dutch": "auto"
    },
    {
      "english": "house",
      "dutch": "huis"
    }
  ]
}
```

```
word_model = api.model(
    "word",
    {
        "english": fields.String(),
},
)
```

```
{
  "words": [
    {
      "english": "car"
    },
    {
      "english": "house"
    }
  ]
}
```

```
word_model = api.model(
    "word",
    {
        "english": fields.String(),
        "dutch": fields.String(),
        "success": fields.Boolean(required=True, choices=(False, True), default=True),
    },
)
```

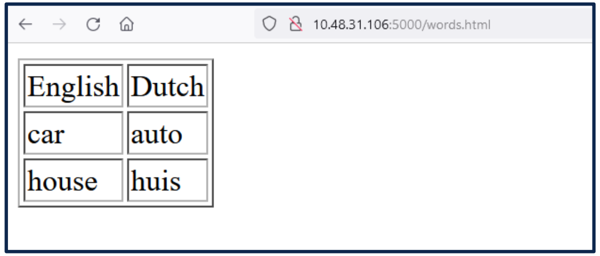
```
{
  "words": [
    {
      "english": "car",
      "dutch": "auto",
      "success": true
    },
    {
      "english": "house",
      "dutch": "huis",
      "success": true
    }
  ]
}
```

Render_template

- Flask can auto-generate a web page
- Based on templates
- Use of Jinja2 template engine

- You can build an entire web-app with it

Return HTML page with our words



10.48.31.106:5000/words.html

English	Dutch
car	auto
house	huis

```
class Words_UI(Resource):
    def get(self):
        headers = {'Content-Type': 'text/html'}
        return make_response(render_template('words.html', dictionary=dictionary),headers)

api.add_resource(Words_UI, "/words.html", endpoint="Words UI endpoint")
```

```
<html>
        <head>
                <title>All known words</title>
        </head>
        <body>

                <table border=1>
                        <tr><td>English</td><td>Dutch</td></tr>
                        {% for entry in dictionary  %}
                                <tr>
                                        <td>{{ entry['english'] }}</td>
                                        <td>{{ entry['dutch'] }}</td>
                                </tr>
                        {% endfor %}
                </table>

        </body>
</html>
```

Our use-case

Manage an ACI fabric – node management

- Provide a UI to
  - Show all nodes
  - Remove a node
  - Add a node

- Option 1) Use Flask as API + Javascript UI
- Option 2) Use Flask and render_template

Use Flask as API + Javascript UI

Our API - response model / parser

```
model_node = api.model(
    "node",
    {
        "model": fields.String(),
        "serial": fields.String(),
        "dn": fields.String(),
        "role": fields.String(),
        "name": fields.String(),
        "id": fields.String(),
        "fabricSt": fields.String(),
    },
)

model_nodes = api.model("nodes", {"nodes":
fields.List(fields.Nested(model_node))})
```

Response model nodes

```
gen_response_model = api.model(
    "gen_response",
    {
        "success": fields.Boolean(required=True, choices=(False, True)),
        "message": fields.String(required=True),
    },
)
```

Response model – generic

```
# Node parser
node_parser = reqparse.RequestParser(bundle_errors=True)
node_parser.add_argument("id", required=True, type=int)
```

Delete node parser

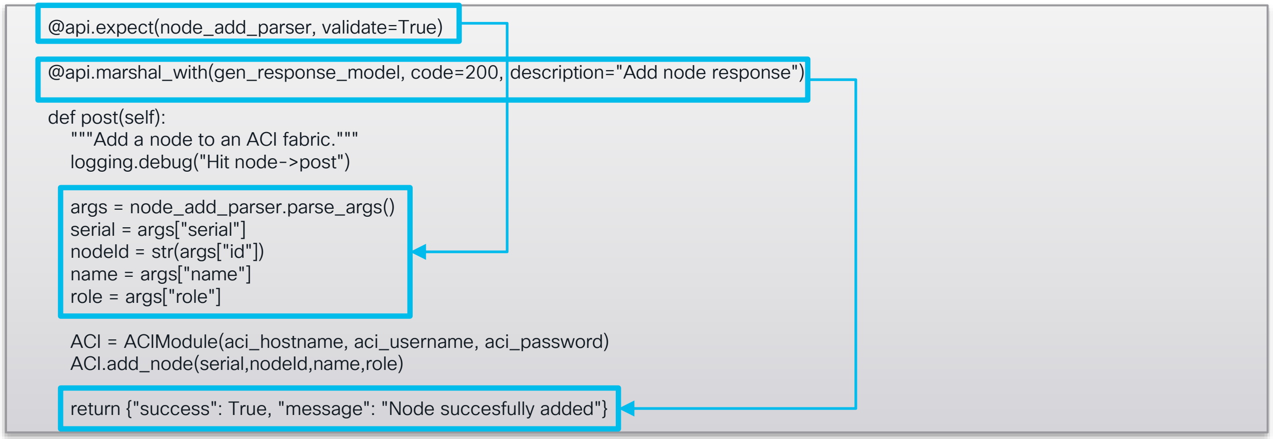
```
node_add_parser = node_parser.copy()
node_add_parser.add_argument("serial", required=True, type=str)
node_add_parser.add_argument("name", required=True, type=str)
node_add_parser.add_argument("role", required=True, choices=("leaf", "spine"))
```

Add node parser

Our API - retrieve nodes

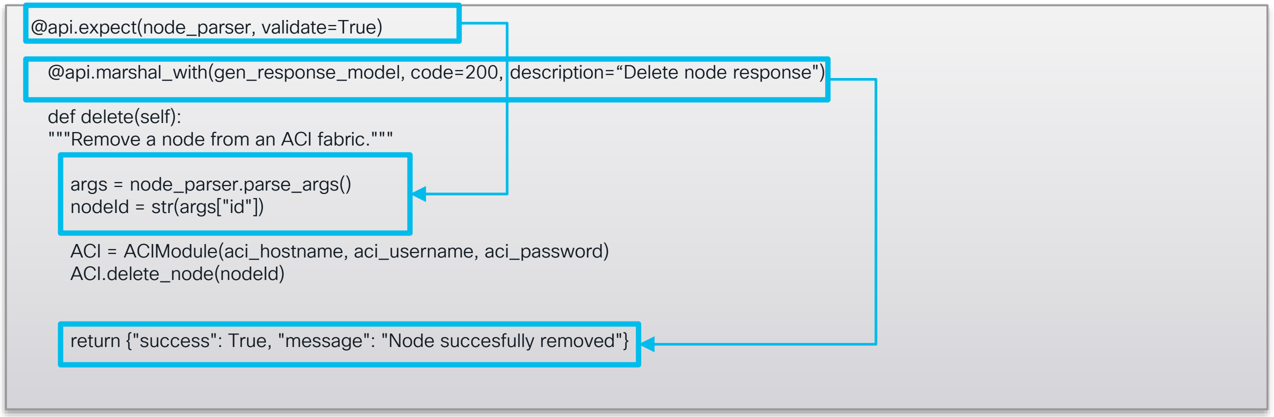
```
class node(Resource):
    """API Class for node."""

    @api.marshal_with(model_nodes, code=200, description="get node response")
    def get(self):
        """Retrieve all nodes in an ACI fabric."""
        logging.debug("Hit node->get")
        ACI = ACIModule(aci_hostname, aci_username, aci_password)
        nodes = ACI.get_nodes()

        cleaned_nodes = []
        for node in nodes["imdata"]:
            cleaned_nodes.append(node["fabricNode"]["attributes"])
        # logging.debug(cleaned_nodes)

        return {"nodes": cleaned_nodes}
```

Our API - add node



```
@api.expect(node_add_parser, validate=True)

@api.marshal_with(gen_response_model, code=200, description="Add node response")

def post(self):
    """Add a node to an ACI fabric."""
    logging.debug("Hit node->post")

    args = node_add_parser.parse_args()
    serial = args["serial"]
    nodeId = str(args["id"])
    name = args["name"]
    role = args["role"]

    ACI = ACIModule(aci_hostname, aci_username, aci_password)
    ACI.add_node(serial,nodeId,name,role)

    return {"success": True, "message": "Node succesfully added"}
```

Our API - delete node



```
@api.expect(node_parser, validate=True)
  @api.marshal_with(gen_response_model, code=200, description="Delete node response")
  def delete(self):
  """Remove a node from an ACI fabric."""
    args = node_parser.parse_args()
    nodeId = str(args["id"])
    ACI = ACIModule(aci_hostname, aci_username, aci_password)
    ACI.delete_node(nodeId)

    return {"success": True, "message": "Node succesfully removed"}
```

Our API - versioning

```
api.add_resource(node, "/api/v0/node", endpoint="node")
```

Host through Apache – main vhost

```
<virtualhost 10.48.31.106:80>
 Header always set Access-Control-Allow-Origin "*"
 Header always set Access-Control-Allow-Methods "POST, GET, OPTIONS, DELETE, PUT"
 Header always set Access-Control-Max-Age "1000"
 Header always set Access-Control-Allow-Headers "x-requested-with, Content-Type, origin, authorization, accept, client-security-token"
 Header always set Access-Control-Allow-Credentials  "true"

 DocumentRoot /var/www/html
 ServerName  rs-coding.cisco.com

 Customlog /var/log/httpd/rs-coding.cisco.com-access.log combined
 ErrorLog /var/log/httpd/rs-coding.cisco.com-error.log

 <location /api/>
    ProxyPassReverse http://127.0.0.1:4242/api/
    ProxyPass http://127.0.0.1:4242/api/
 </Location>
 <location /doc>
   ProxyPassReverse http://127.0.0.1:4242/doc
   ProxyPass http://127.0.0.1:4242/doc
 </Location>

 <Location "/swaggerui">
   ProxyPassReverse http://127.0.0.1:4242/swaggerui
   ProxyPass http://127.0.0.1:4242/swaggerui
 </Location>
 <Location "/swagger.json">
   ProxyPassReverse http://127.0.0.1:4242/swagger.json
   ProxyPass http://127.0.0.1:4242/swagger.json
 </Location>

</VirtualHost>
```

You can also host through nginx or any other proxy

Don’t just run, use WSGI

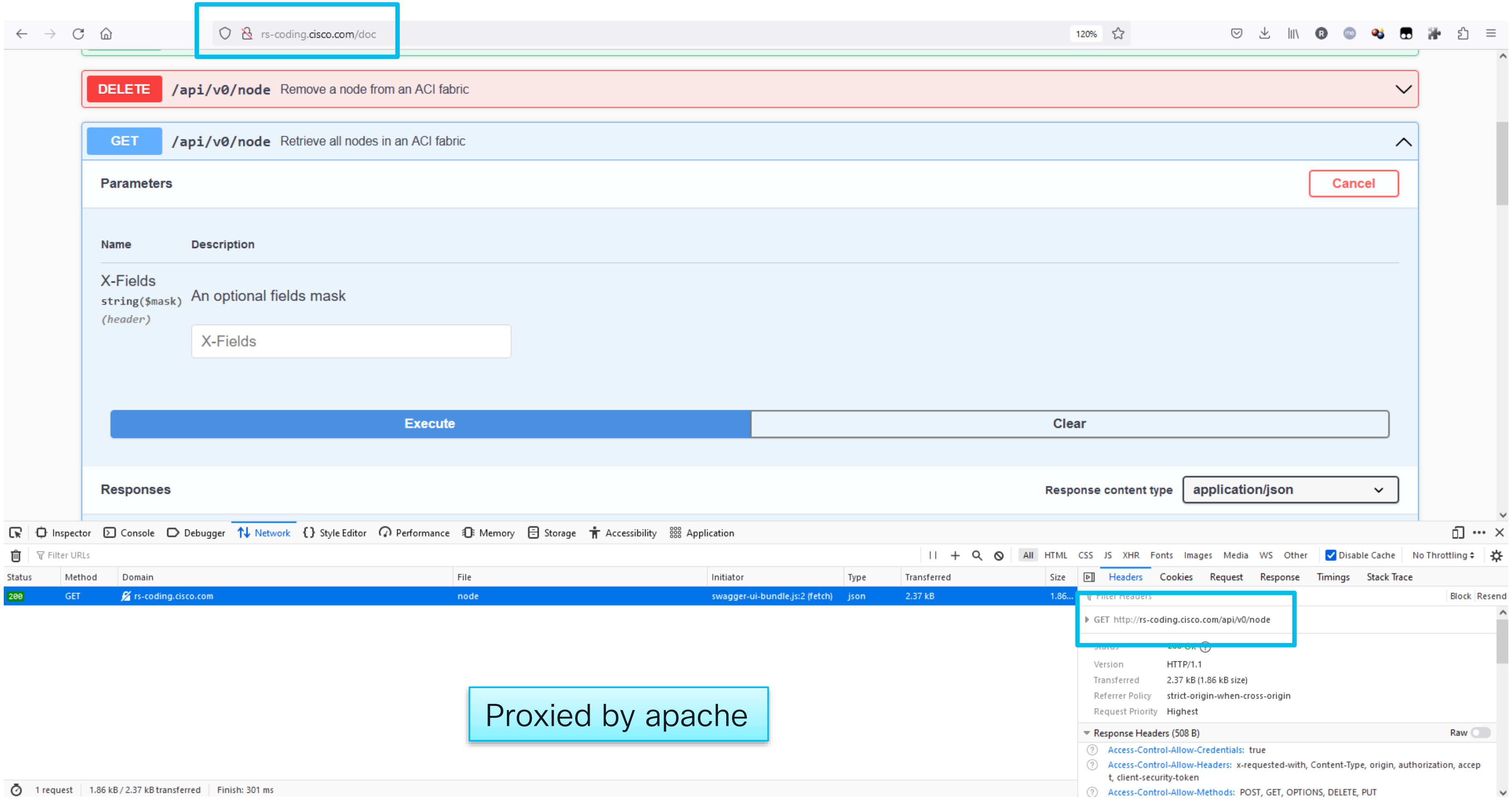
- Flask is a micro-web framework for Python
  - Flask is not a webserver

- Use WSGI to allow Apache to interact with Python

Host through Apache – WSGI vhost

```
Listen 4242
<VirtualHost 127.0.0.1:4242>

    WSGIDaemonProcess devnet_flask_api user=rsmeyers group=rsmeyers   threads=15
    WSGIScriptAlias / /home/rsmeyers/devnet-flask-api/devnet_flask_api.wsgi
    WSGIScriptReloading On

    <Directory /home/rsmeyers/devnet-flask-api>
      WSGIProcessGroup devnet_flask_api
      WSGIApplicationGroup %{GLOBAL}
      Require all granted
    </Directory>
</VirtualHost>
```

```
[rsmeyers@rs-coding devnet-flask-api]$ pwd
/home/rsmeyers/devnet-flask-api
[rsmeyers@rs-coding devnet-flask-api]$ cat devnet_flask_api.wsgi
#!/usr/bin/python3

import sys
sys.path.insert(0, '/home/rsmeyers/devnet-flask-api')

sys.stdout = sys.stderr

from devnet_flask_api import app as application
```



rs-coding.cisco.com/doc

DELETE `/api/v0/node` Remove a node from an ACI fabric

GET `/api/v0/node` Retrieve all nodes in an ACI fabric

Parameters Cancel

Name	Description
X-Fields `string($mask)` *(header)*	An optional fields mask X-Fields

Execute | Clear

Responses Response content type application/json

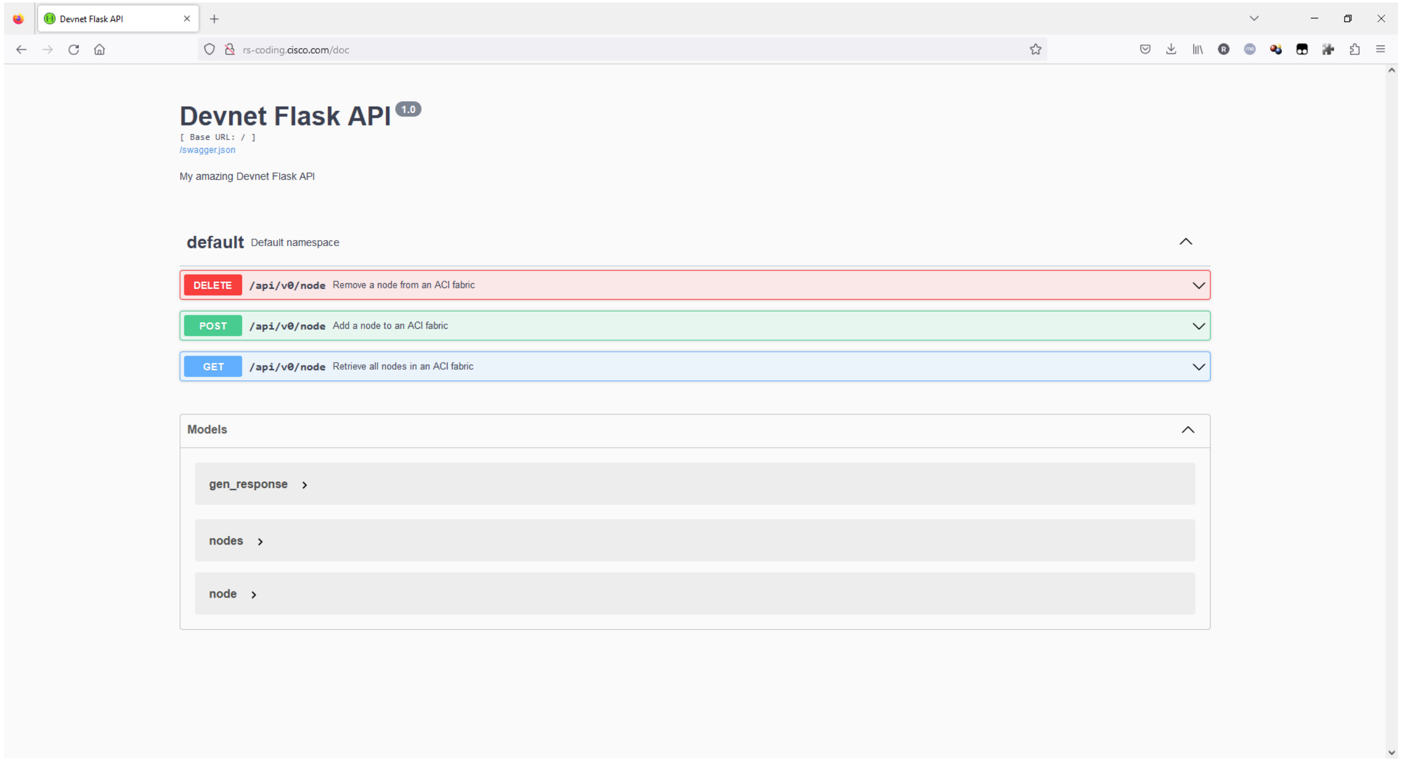
Status	Method	Domain	File	Initiator	Type	Transferred	Size
200	GET	rs-coding.cisco.com	node	swagger-ui-bundle.js:2 (fetch)	json	2.37 kB	1.86...

```
GET http://rs-coding.cisco.com/api/v0/node

Version          HTTP/1.1
Transferred      2.37 kB (1.86 kB size)
Referrer Policy  strict-origin-when-cross-origin
Request Priority Highest

Response Headers (508 B)
Access-Control-Allow-Credentials: true
Access-Control-Allow-Headers: x-requested-with, Content-Type, origin, authorization, accep
t, client-security-token
Access-Control-Allow-Methods: POST, GET, OPTIONS, DELETE, PUT
```

1 request | 1.86 kB / 2.37 kB transferred | Finish: 301 ms

Proxied by apache

Our swagger page



Devnet Flask API

rs-coding.cisco.com/doc

Devnet Flask API 1.0

[Base URL: /]

/swagger.json

My amazing Devnet Flask API

default Default namespace

DELETE `/api/v0/node` Remove a node from an ACI fabric

POST `/api/v0/node` Add a node to an ACI fabric

GET `/api/v0/node` Retrieve all nodes in an ACI fabric

Models

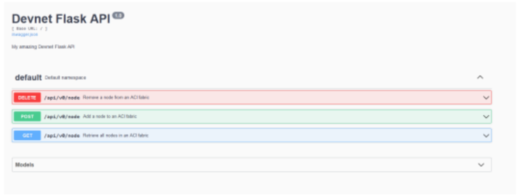
gen_response ›

nodes ›

node ›

Meet our UI developer

- Expert in Angular/React/JS/…
- No prior DC knowledge
- His only input
  - http://rs-coding.cisco.com/doc
  - A quick Webex discussion


Devnet Flask API 1.0

[Base URL: /]

swagger.json

My amazing Devnet Flask API

default Default namespace

DELETE /api/v0/node Remove a node from an ACI fabric

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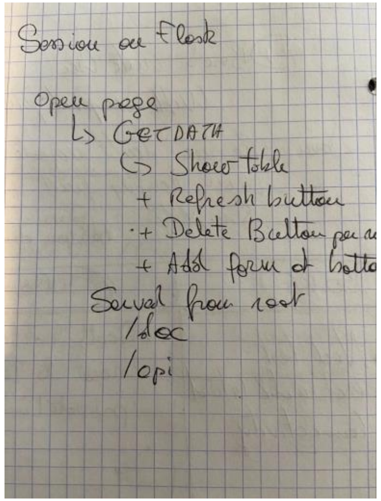
Models


Session on Flask

Open page
  ↳ GETDATA
    ↳ Show table
      + Refresh button
      + Delete Button per
      + Add form at botto
  Served from root
    /doc
    /api

Didier Colens

Javascript to the rescue

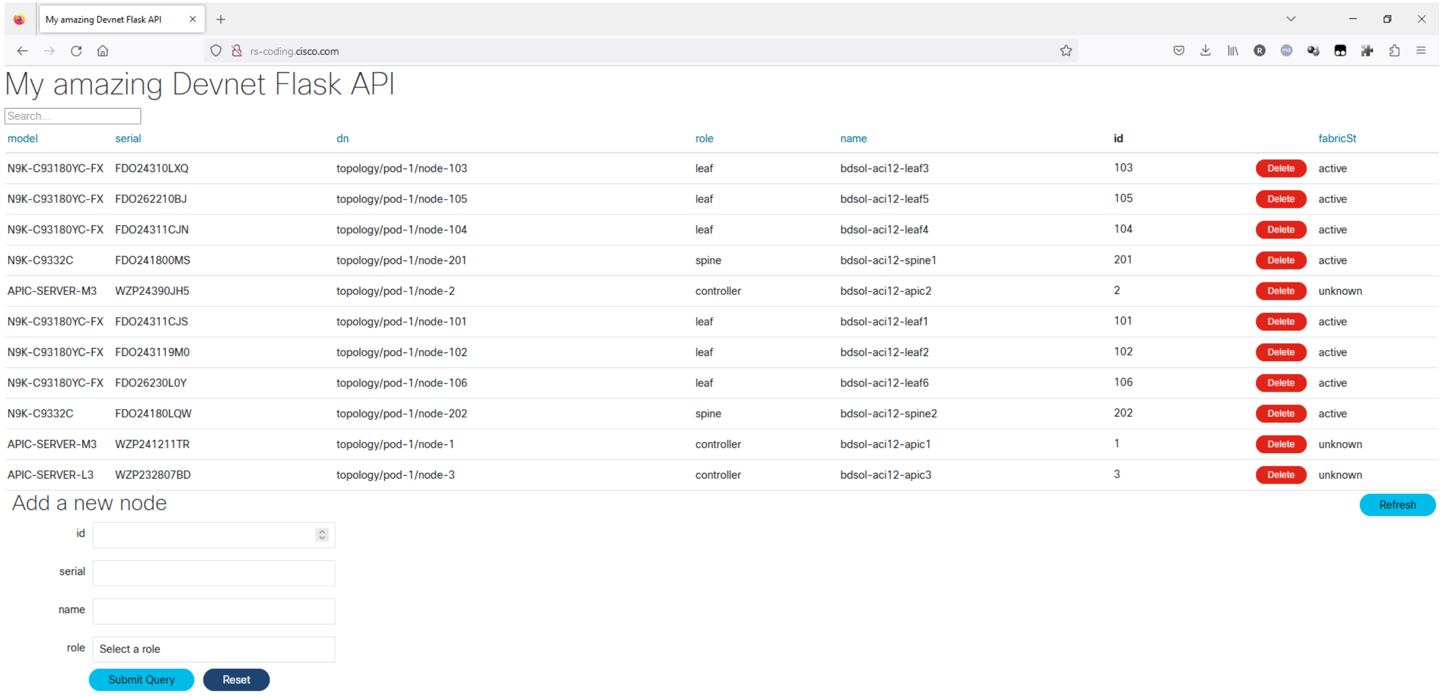
API Code

```
export default class MyAmazingDevnetFlaskApi {
  constructor(baseUri = 'http://rs-coding.cisco.com/api/v0/node') {
    this.baseUri = baseUri;
  }

  async getNodes() {
    const response = await fetch(this.baseUri);
    return response.json();
  }

  async deleteNode(id) {
    const searchParams = new URLSearchParams({ id });

    const response = await fetch(`${this.baseUri}?${searchParams.toString()}`, {
      method: 'DELETE',
    });

    return response.json();
  }

  async addNode(node) {
    const searchParams = new URLSearchParams(node);

    const response = await fetch(`${this.baseUri}?${searchParams.toString()}`, {
      method: 'POST',
    });

    return response.json();
  }
}
```

Delete row code

```
document.getElementById('table').addEventListener('click', async (event) => {
  if (event.target.classList.contains('deleteRow')) {
    event.preventDefault();
    console.log(`delete for ${event.target.getAttribute('data-id')} clicked`);

    const button = event.target;

    try {
      button.disabled = true;
      await api.deleteNode(button.getAttribute('data-id'));
      table.removeRow(button.getAttribute('data-rowIndex'));
    } catch (error) {
      console.error(
        `failed to delete ${button.getAttribute('data-id')}`,
        error,
      );
    } finally {
      button.disabled = false;
    }
  }
});
```

The result



My amazing Devnet Flask API

Search...

model	serial	dn	role	name	id		fabricSt
N9K-C93180YC-FX	FDO24310LXQ	topology/pod-1/node-103	leaf	bdsol-aci12-leaf3	103	Delete	active
N9K-C93180YC-FX	FDO262210BJ	topology/pod-1/node-105	leaf	bdsol-aci12-leaf5	105	Delete	active
N9K-C93180YC-FX	FDO24311CJN	topology/pod-1/node-104	leaf	bdsol-aci12-leaf4	104	Delete	active
N9K-C9332C	FDO241800MS	topology/pod-1/node-201	spine	bdsol-aci12-spine1	201	Delete	active
APIC-SERVER-M3	WZP24390JH5	topology/pod-1/node-2	controller	bdsol-aci12-apic2	2	Delete	unknown
N9K-C93180YC-FX	FDO24311CJS	topology/pod-1/node-101	leaf	bdsol-aci12-leaf1	101	Delete	active
N9K-C93180YC-FX	FDO243119M0	topology/pod-1/node-102	leaf	bdsol-aci12-leaf2	102	Delete	active
N9K-C93180YC-FX	FDO26230L0Y	topology/pod-1/node-106	leaf	bdsol-aci12-leaf6	106	Delete	active
N9K-C9332C	FDO24180LQW	topology/pod-1/node-202	spine	bdsol-aci12-spine2	202	Delete	active
APIC-SERVER-M3	WZP241211TR	topology/pod-1/node-1	controller	bdsol-aci12-apic1	1	Delete	unknown
APIC-SERVER-L3	WZP232807BD	topology/pod-1/node-3	controller	bdsol-aci12-apic3	3	Delete	unknown

Refresh

Add a new node

id	
serial	
name	
role	Select a role

Submit Query   Reset

What if I do not know Javascript

Doing it all in Python / Flask

- Flask is a micro-web framework for Python
- Look at it as the easy way for a Python coder to build an entire webapp

- Use render_template to auto generate web pages

Use Flask and render_template

Our new endpoint – serves an html page

```
class Start(Resource):
    def get(self):
        """Retrieve all nodes in an ACI fabric."""
        ACI = ACIModule(aci_hostname, aci_username, aci_password)
        nodes = ACI.get_nodes()

        headers = {'Content-Type': 'text/html'}
        return make_response(render_template('start.html', nodes=nodes),headers)

    @api.expect(node_add_parser, validate=True)
    def post(self):
        """Add a node to an ACI fabric."""
        logging.debug("Hit node->post")

        args = node_add_parser.parse_args()
        serial = args["serial"]
        nodeId = str(args["id"])
        name = args["name"]
        role = args["role"]

        ACI = ACIModule(aci_hostname, aci_username, aci_password)
        ACI.add_node(serial,nodeId,name,role)

        sleep(1)

        nodes = ACI.get_nodes()
        headers = {'Content-Type': 'text/html'}
        return make_response(render_template('start.html', nodes=nodes),headers)
```

```
    @api.expect(node_parser, validate=True)
    def delete(self):
        """Remove a node from an ACI fabric."""

        args = node_parser.parse_args()
        nodeId = str(args["id"])

        ACI = ACIModule(aci_hostname, aci_username, aci_password)
        ACI.delete_node(nodeId)

        nodes = ACI.handle_req("get", "node/class/fabricNode.json")
        headers = {'Content-Type': 'text/html'}
        return make_response(render_template('start.html', nodes=nodes),headers)
api.add_resource(Start, "/api/v0/nodes.html", endpoint="Nodes HTML page")
```

- Same code as before
- No Marshall
- Return HTML page

Out HTML template

```
<html>
	<head>
		<title>All known nodes</title>
		<script type="module" src="http://rs-coding.cisco.com/index-render.js"></script>
	</head>
	<body>
		<h1>All nodes</h1>
		<table border=1>
			<tr>
				<td>ID</td>
				<td>Name</td>
				<td>Model</td>
				<td>Serial</td>
				<td>DN</td>
				<td>Role</td>
				<td>fabricSt</td>
				<td>Delete</td>
			</tr>
			{% for entry in nodes['imdata']  %}
				<tr>
					<td>{{ entry['fabricNode']['attributes']['id'] }}</td>
					<td>{{ entry['fabricNode']['attributes']['name'] }}</td>
					<td>{{ entry['fabricNode']['attributes']['model'] }}</td>
					<td>{{ entry['fabricNode']['attributes']['serial'] }}</td>
					<td>{{ entry['fabricNode']['attributes']['dn'] }}</td>
					<td>{{ entry['fabricNode']['attributes']['role'] }}</td>
					<td>{{ entry['fabricNode']['attributes']['fabricSt'] }}</td>
					<td>
						<button class="deleteRow" type='button' fabricNode="{{
entry['fabricNode']['attributes']['id'] }}" >Delete</button>
					</td>
				</tr>
			{% endfor %}
		</table>
```

```
		<h2>Add node</h2>

		<form action="nodes.html" method=post>
			<ul>
				<li>
					<label>Number:</label>
					<input type="number" name="id" />
				</li>
				<li>
					<label>Serial:</label>
					<input type="string" name="serial" />
				</li>
				<li>
					<label>Name:</label>
					<input type="string" name="name" />
				</li>
				<li>
					<label>Role:</label>
					<select name="role">
						<option value="leaf">leaf</option>
						<option value="spine">spine</option>
					</select>
				</li>
			</ul>
			<input type="submit" value=add >
		</form>

	</body>
</html>
```

POST is easy
DELETE requires a trick

HTML only knows GET and POST

HTML

```html
<button class="deleteRow" type='button' fabricNode="{{ entry['fabricNode']['attributes']['id'] }}" >Delete</button>
```

index-render.js

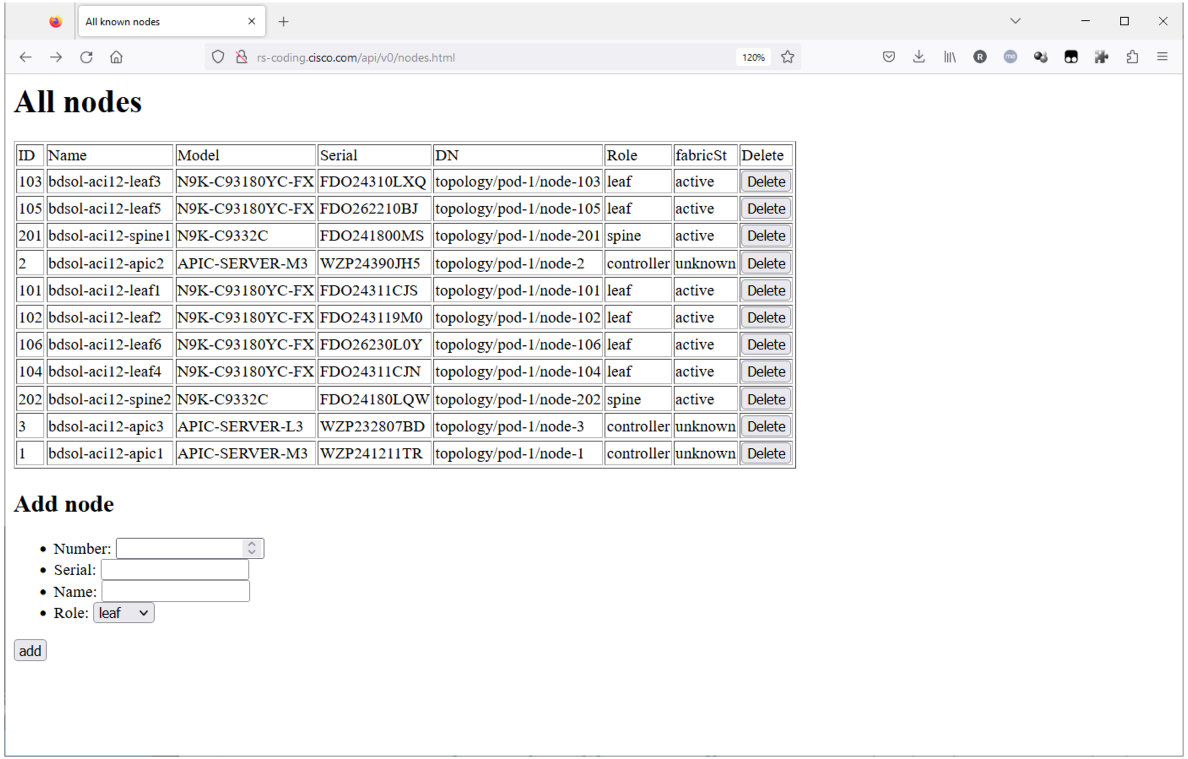
```javascript
document.addEventListener('click', async (event) => {
    if (event.target.classList.contains('deleteRow')) {
        event.preventDefault();
        console.log(`delete for ${event.target.getAttribute('fabricNode')} clicked`);

        const button = event.target;

        try {
            var baseUri = 'http://rs-coding.cisco.com/api/v0/nodes.html';
            const response = await fetch(`${baseUri}?id=${event.target.getAttribute('fabricNode')}`, {
                method: 'DELETE',
            });
            window.location.href = baseUri;

        } catch (error) {
            console.error(
                `failed to delete ${button.getAttribute('data-id')}`,
                error,
            );
        } finally {
            button.disabled = false;
        }


    }
});
```

Perform delete

Refresh page

Use a framework, Angular, React, ...

The result



All nodes

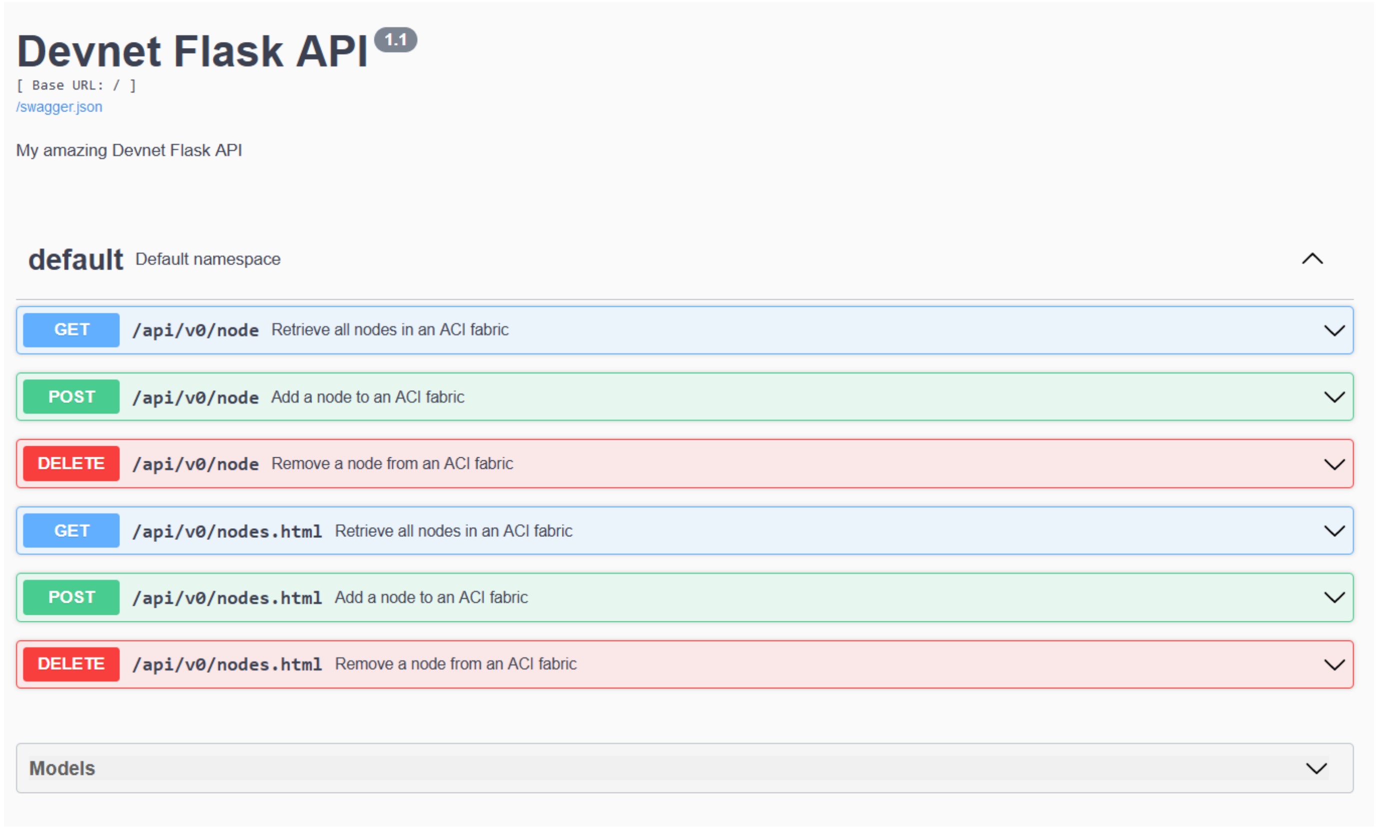
ID	Name	Model	Serial	DN	Role	fabricSt	Delete
103	bdsol-aci12-leaf3	N9K-C93180YC-FX	FDO24310LXQ	topology/pod-1/node-103	leaf	active	Delete
105	bdsol-aci12-leaf5	N9K-C93180YC-FX	FDO262210BJ	topology/pod-1/node-105	leaf	active	Delete
201	bdsol-aci12-spine1	N9K-C9332C	FDO241800MS	topology/pod-1/node-201	spine	active	Delete
2	bdsol-aci12-apic2	APIC-SERVER-M3	WZP24390JH5	topology/pod-1/node-2	controller	unknown	Delete
101	bdsol-aci12-leaf1	N9K-C93180YC-FX	FDO24311CJS	topology/pod-1/node-101	leaf	active	Delete
102	bdsol-aci12-leaf2	N9K-C93180YC-FX	FDO243119M0	topology/pod-1/node-102	leaf	active	Delete
106	bdsol-aci12-leaf6	N9K-C93180YC-FX	FDO26230L0Y	topology/pod-1/node-106	leaf	active	Delete
104	bdsol-aci12-leaf4	N9K-C93180YC-FX	FDO24311CJN	topology/pod-1/node-104	leaf	active	Delete
202	bdsol-aci12-spine2	N9K-C9332C	FDO24180LQW	topology/pod-1/node-202	spine	active	Delete
3	bdsol-aci12-apic3	APIC-SERVER-L3	WZP232807BD	topology/pod-1/node-3	controller	unknown	Delete
1	bdsol-aci12-apic1	APIC-SERVER-M3	WZP241211TR	topology/pod-1/node-1	controller	unknown	Delete

Add node

- Number:
- Serial:
- Name:
- Role: leaf

add

Our swagger page



Devnet Flask API 1.1

[Base URL: /]

/swagger.json

My amazing Devnet Flask API

default Default namespace

GET /api/v0/node Retrieve all nodes in an ACI fabric

POST /api/v0/node Add a node to an ACI fabric

DELETE /api/v0/node Remove a node from an ACI fabric

GET /api/v0/nodes.html Retrieve all nodes in an ACI fabric

POST /api/v0/nodes.html Add a node to an ACI fabric

DELETE /api/v0/nodes.html Remove a node from an ACI fabric

Models

Demo

Fill out your session surveys!

Attendees who fill out a minimum of four session surveys and the overall event survey will get **Cisco Live-branded socks** (while supplies last)!

Attendees will also earn 100 points in the **Cisco Live Challenge** for every survey completed.

These points help you get on the leaderboard and increase your chances of winning daily and grand prizes

Continue your education

- Visit the Cisco Showcase for related demos
- Book your one-on-one Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand

The bridge to possible

Thank you

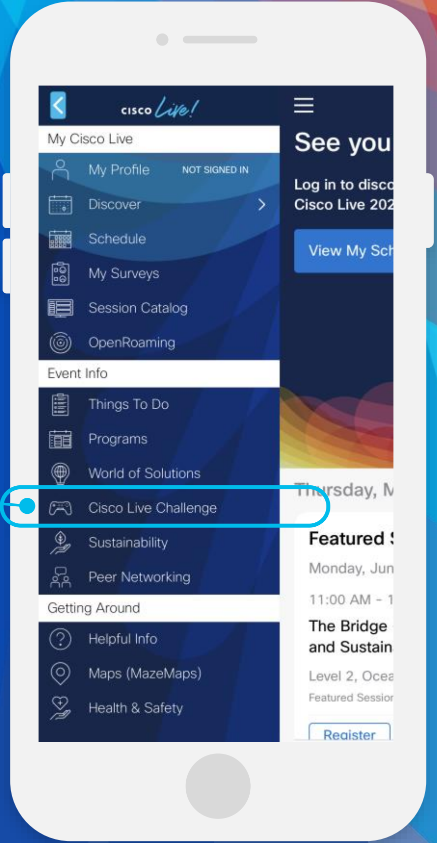
Cisco Live **Challenge**

Gamify your Cisco Live experience!

Get points for attending this session!

How:

1. Open the Cisco Events App.
2. Click on 'Cisco Live Challenge' in the side menu.
3. Click on View Your Badges at the top.
4. Click the + at the bottom of the screen and scan the QR code:



cisco Live!

Let's go