Automating Cisco APIC Configuration with Postman: A Practical Guide

Amin H. Younessi
Reonel Oy

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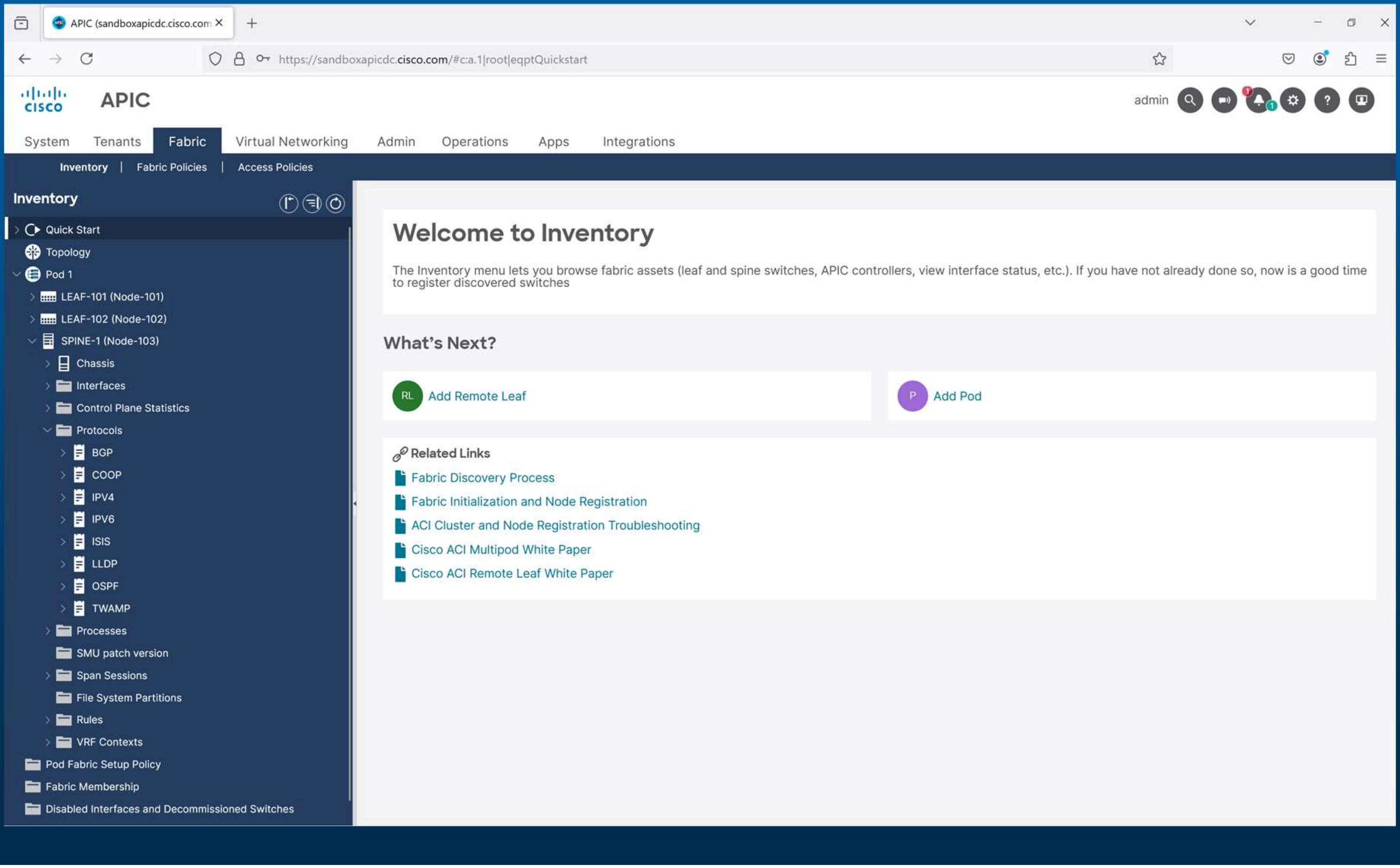
About me

- A brief background about me
- Cisco NetAcad Trainer
- MikroTik Certified Trainer and consultant from 2016
- Ubiquiti Certified Trainer from 2017 to 2025

Presentation Topics

- Introduction to ACI
- Understanding the basic of ACI
- Automation in ACI
- Object structure model in ACI
- Practical demonstration

Introduction to Cisco ACI



Welcome to Inventory

The Inventory menu lets you browse fabric assets (leaf and spine switches, APIC controllers, view interface status, etc.). If you have not already done so, now is a good time to register discovered switches

What's Next?

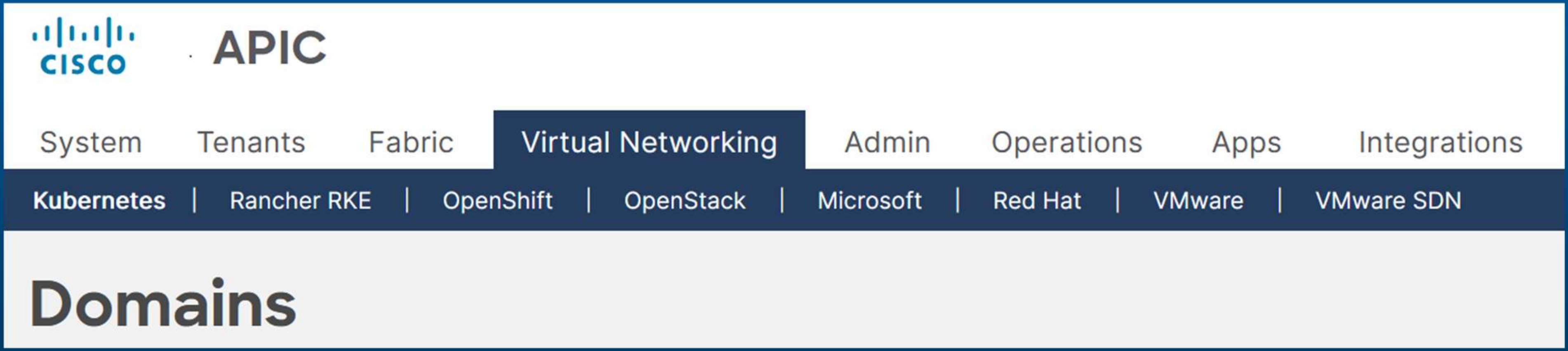
Related Links

- Fabric Discovery Process
- Fabric Initialization and Node Registration
- ACI Cluster and Node Registration Troubleshooting
- Cisco ACI Multipod White Paper
- Cisco ACI Remote Leaf White Paper

Introduction to Cisco ACI

- What is SDN?
- Cisco ACI Can be integrate with the following solutions:
  - Kubernetes
  - Rancher
  - OpenStack
  - OpenShift
  - Microsoft
  - Red Hat
  - VMware & VMware SDN

Introduction to Cisco ACI


APIC
System
Tenants
Fabric
Virtual Networking
Admin
Operations
Apps
Integrations
Kubernetes | Rancher RKE | OpenShift | OpenStack | Microsoft | Red Hat | VMware | VMware SDN
Domains

Understanding the basic of Cisco ACI

- Cisco ACI and the APIC
- APIC REST API
  - It allows us to communicate with the APIC using standard web protocols, primarily HTTP.
  - Sending requests to specific web addresses or endpoints leads to perform actions.
  - These actions typically defined by HTTP methods like **GET** (Retrieve information), **POST** (To create new objects), **PUT** (to modify existing objects) and **DELETE** (to remove objects).
  - The APIC API primarily uses JavaScript Object Notation (JSON) as the data format for both responses (Requests and Receiving).
- Postman overview

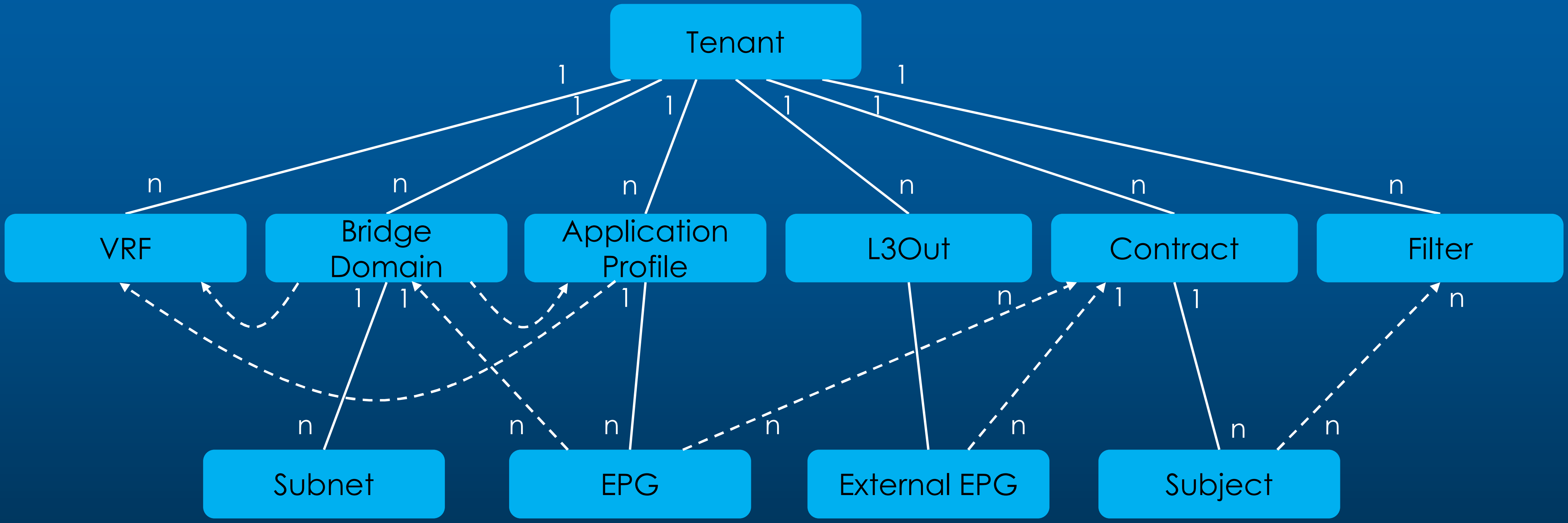
Automation might be a requirement in ACI

- Simplified configuration management.
- Reducing human errors.
- Increasing network reliability.
- Central network management and control.
- Enforcing policies consistently.
- Compatibility with multi-vendor environment.
- Rapid application deployment and many more.

Vital things about Cisco ACI for automation

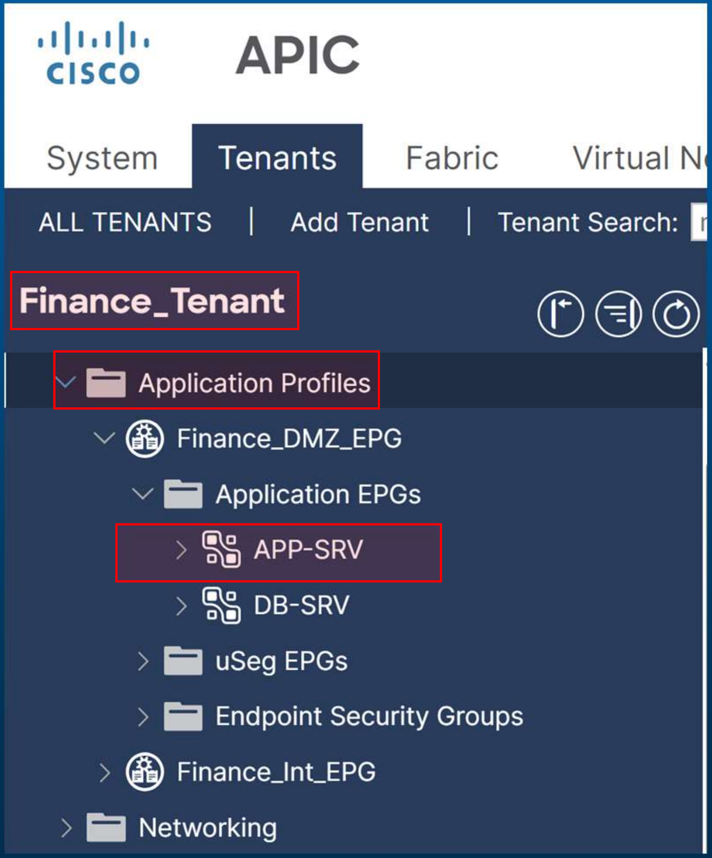
- ACI object structure model and it’s REST API
- Automation tools can be used with ACI
  - REST API
  - Python SDK (Cobra SDK)
  - acitoolkit
  - Ansible
  - Terraform
- Necessary data for configuration

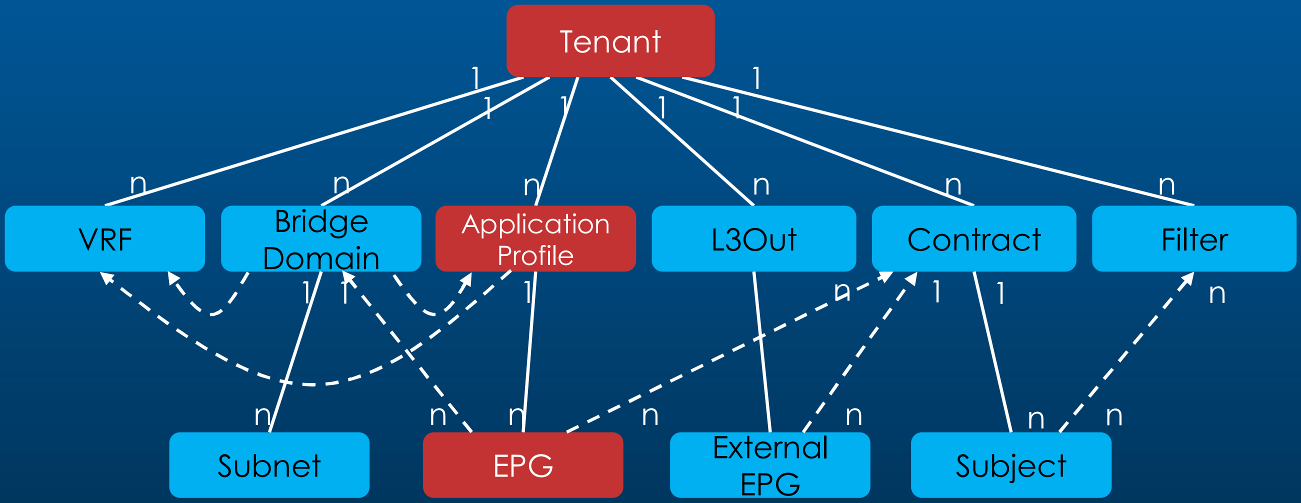
Cisco ACI Object structure model



Description:
1:n means one to many, n:n indicates many to many.
——— Hierarchical structure
- - - - - - - -▸ Referential

Cisco ACI Object structure model




Tenant

VRF

Bridge Domain

Application Profile

L3Out

Contract

Filter

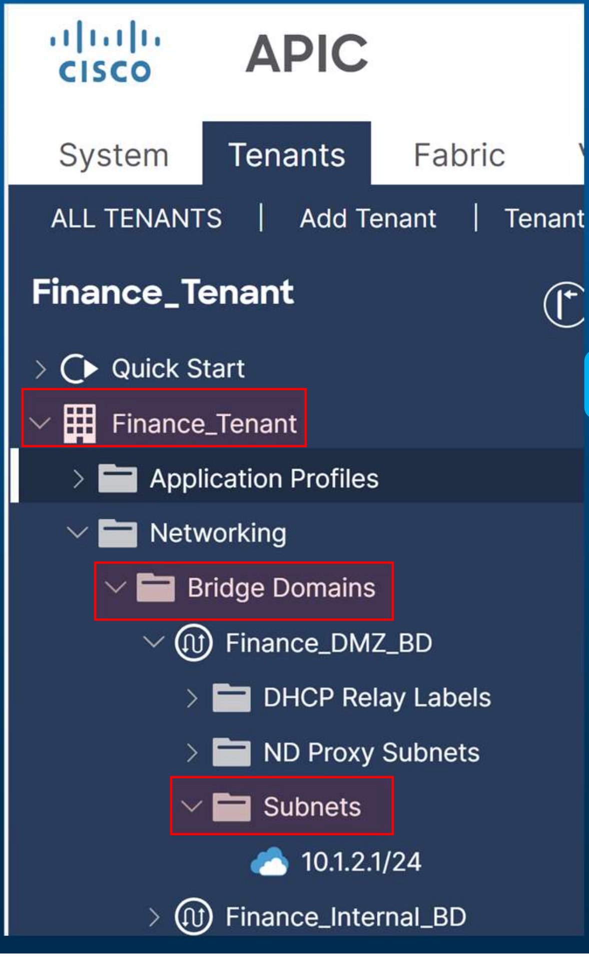
Subnet

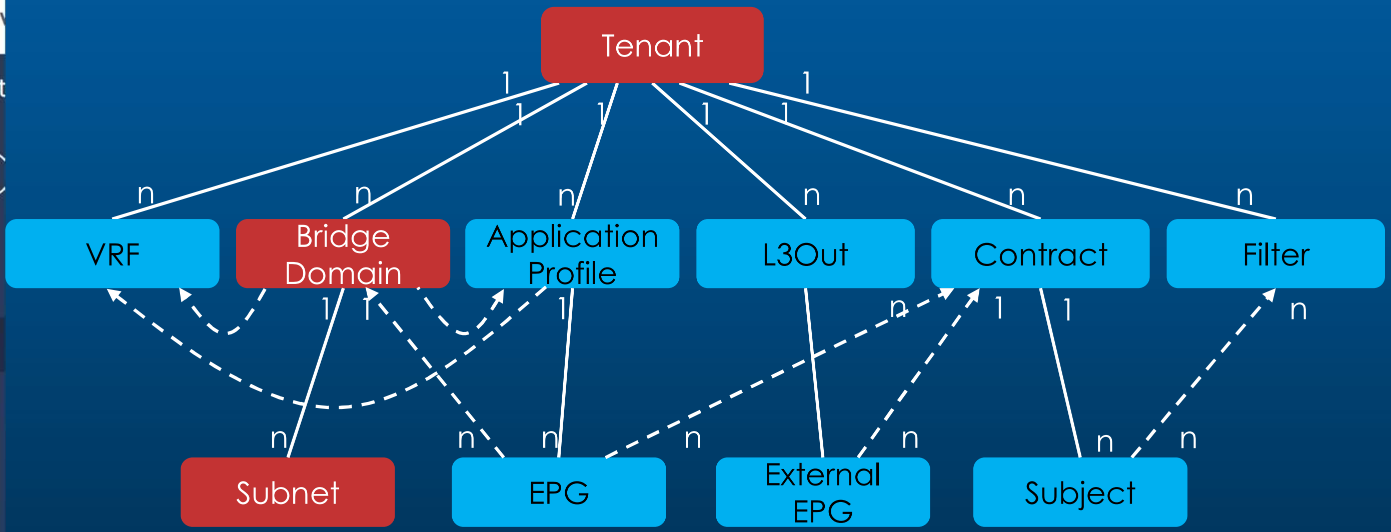
EPG

External EPG

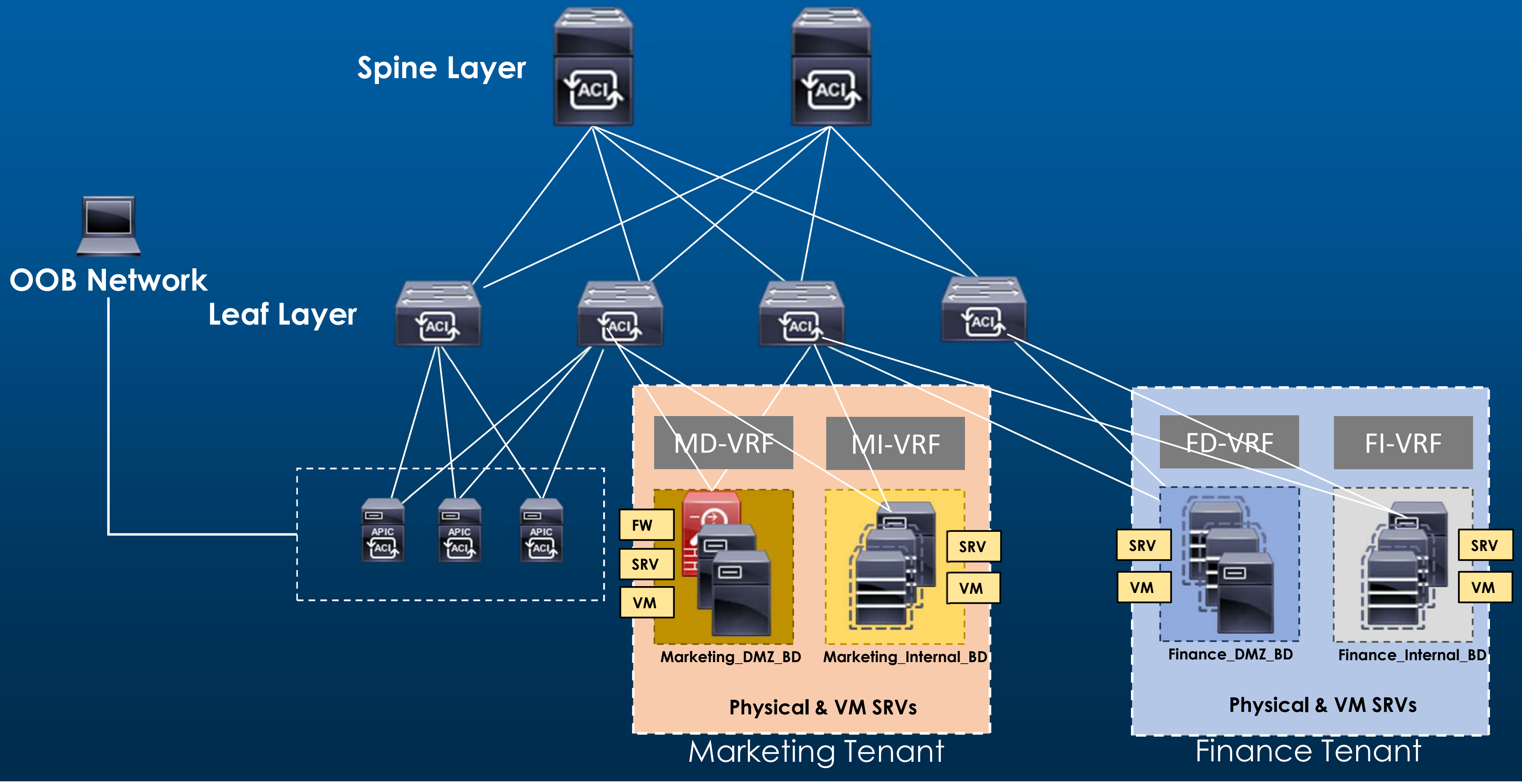
Subject

Cisco ACI Object structure model

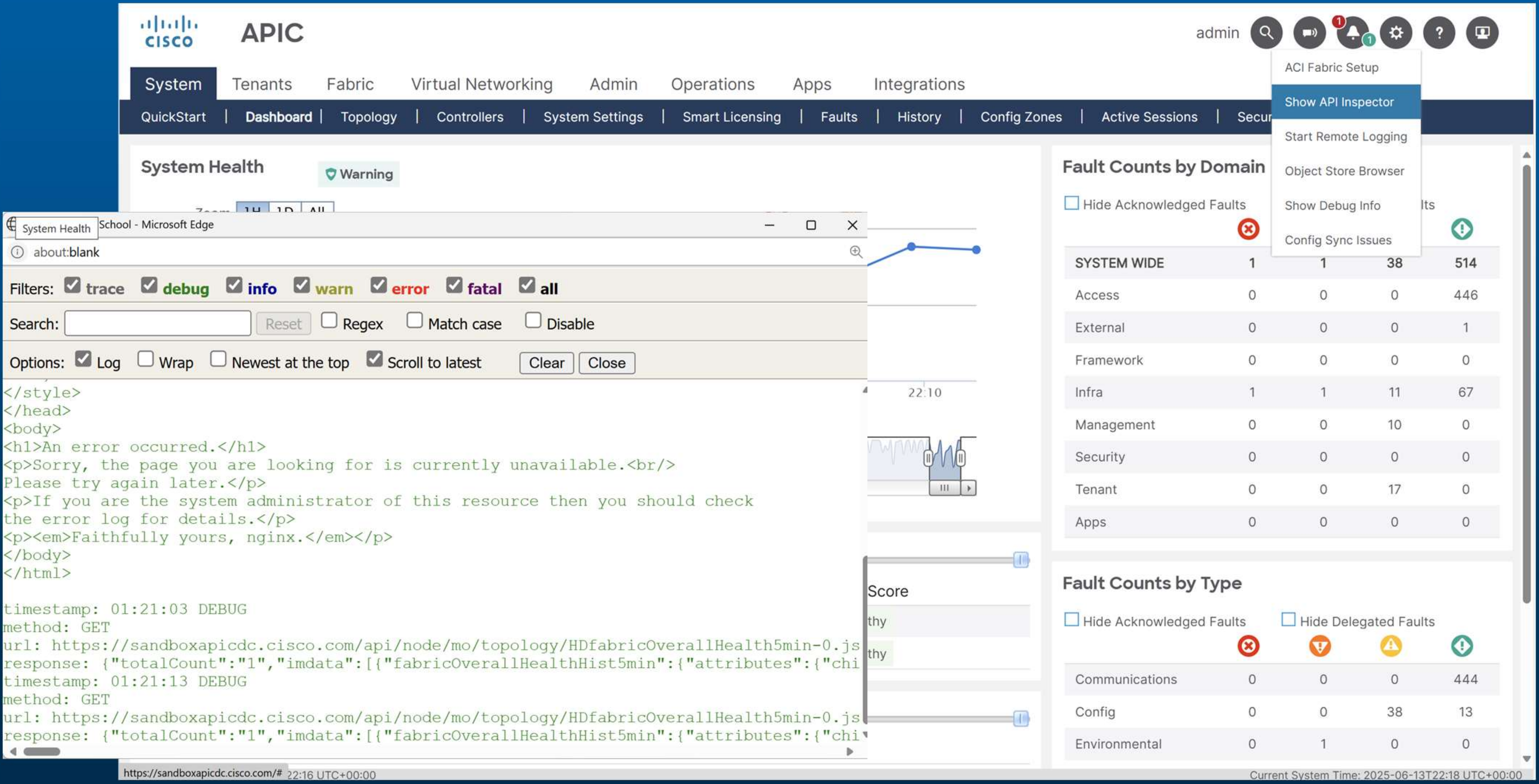




Practical demonstration



Using ACI Inspector to create an API calls



Filters: ☑ trace ☑ debug ☑ info ☑ warn ☑ error ☑ fatal ☑ all

Search: Reset ☐ Regex ☐ Match case ☐ Disable

Options: ☑ Log ☐ Wrap ☐ Newest at the top ☑ Scroll to latest

```
</style>
</head>
<body>
<h1>An error occurred.</h1>
<p>Sorry, the page you are looking for is currently unavailable.<br/>
Please try again later.</p>
<p>If you are the system administrator of this resource then you should check
the error log for details.</p>
<p><em>Faithfully yours, nginx.</em></p>
</body>
</html>

timestamp: 01:21:03 DEBUG
method: GET
url: https://sandboxapicdc.cisco.com/api/node/mo/topology/HDfabricOverallHealth5min-0.js
response: {"totalCount":"1","imdata":[{"fabricOverallHealthHist5min":{"attributes":{"chi
timestamp: 01:21:13 DEBUG
method: GET
url: https://sandboxapicdc.cisco.com/api/node/mo/topology/HDfabricOverallHealth5min-0.js
response: {"totalCount":"1","imdata":[{"fabricOverallHealthHist5min":{"attributes":{"chi
```

Fault Counts by Domain

☐ Hide Acknowledged Faults

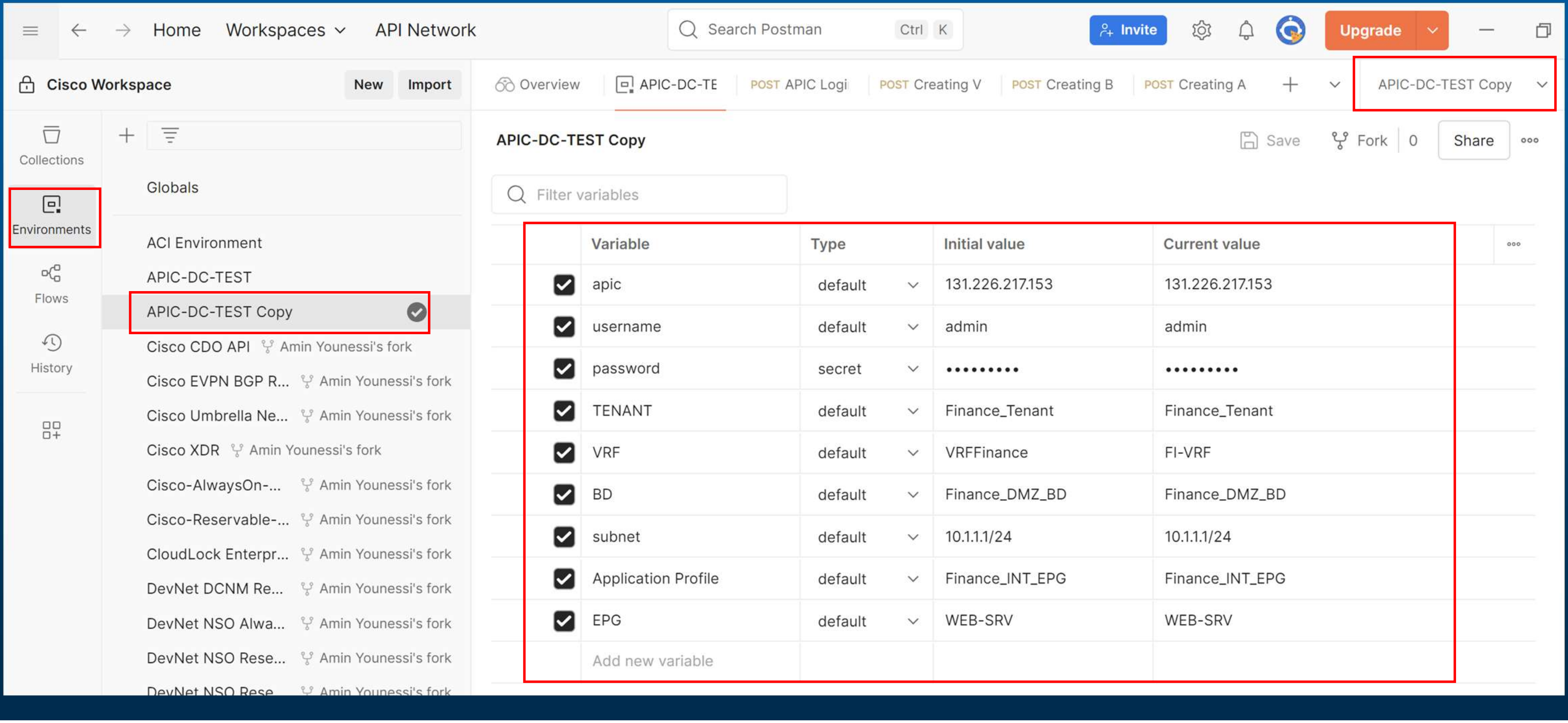
	⊗			ⓘ
SYSTEM WIDE	1	1	38	514
Access	0	0	0	446
External	0	0	0	1
Framework	0	0	0	0
Infra	1	1	11	67
Management	0	0	10	0
Security	0	0	0	0
Tenant	0	0	17	0
Apps	0	0	0	0

Fault Counts by Type

☐ Hide Acknowledged Faults ☐ Hide Delegated Faults

	⊗	▽	⚠	ⓘ
Communications	0	0	0	444
Config	0	0	38	13
Environmental	0	1	0	0

Creating and environment with desired variables



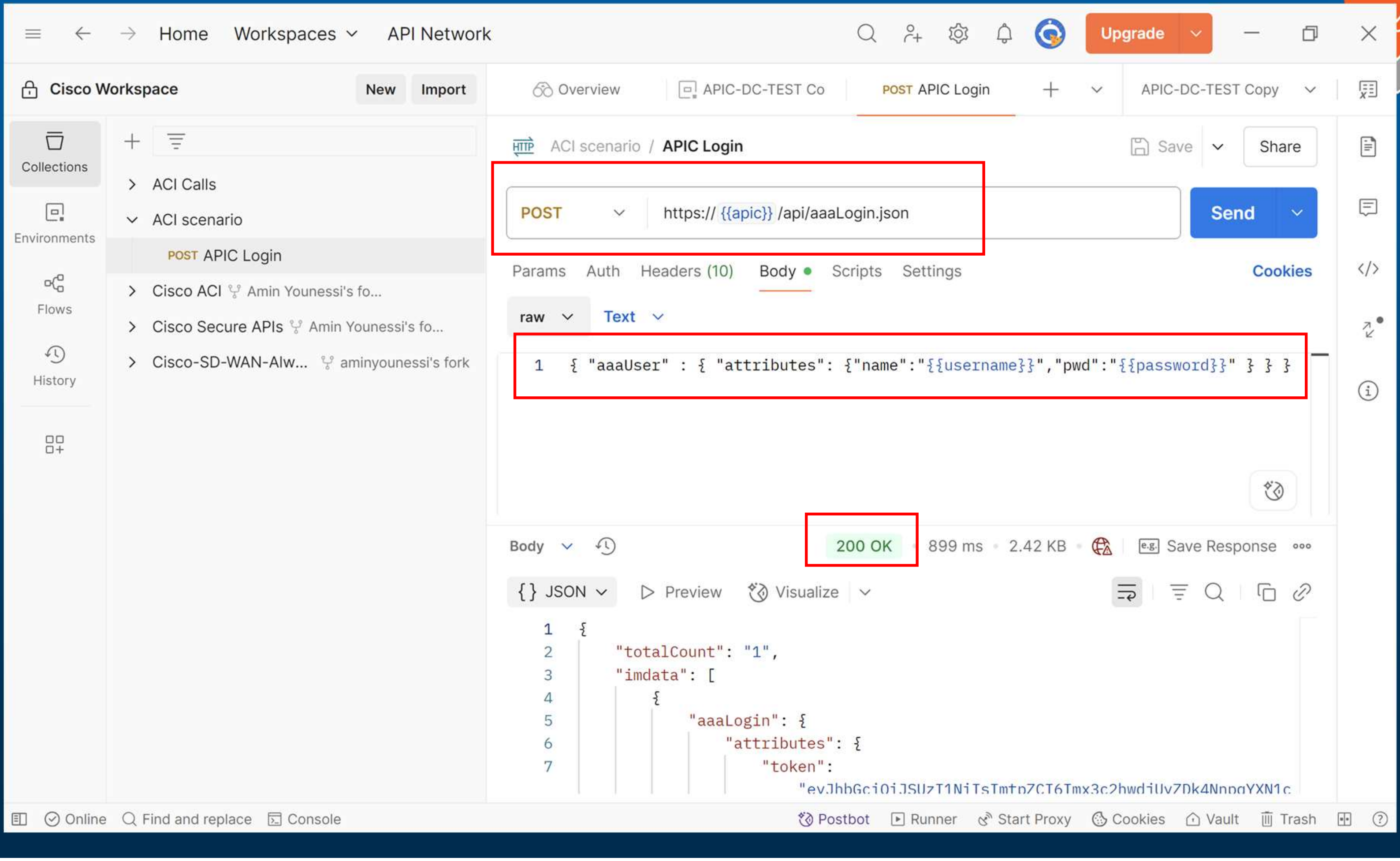
Globals

ACI Environment
APIC-DC-TEST
APIC-DC-TEST Copy
Cisco CDO API Amin Younessi's fork
Cisco EVPN BGP R... Amin Younessi's fork
Cisco Umbrella Ne... Amin Younessi's fork
Cisco XDR Amin Younessi's fork
Cisco-AlwaysOn-... Amin Younessi's fork
Cisco-Reservable-... Amin Younessi's fork
CloudLock Enterpr... Amin Younessi's fork
DevNet DCNM Re... Amin Younessi's fork
DevNet NSO Alwa... Amin Younessi's fork
DevNet NSO Rese... Amin Younessi's fork
DevNet NSO Rese... Amin Younessi's fork

APIC-DC-TEST Copy

	Variable	Type	Initial value	Current value
☑	apic	default	131.226.217.153	131.226.217.153
☑	username	default	admin	admin
☑	password	secret	•••••••••	•••••••••
☑	TENANT	default	Finance_Tenant	Finance_Tenant
☑	VRF	default	VRFFinance	FI-VRF
☑	BD	default	Finance_DMZ_BD	Finance_DMZ_BD
☑	subnet	default	10.1.1.1/24	10.1.1.1/24
☑	Application Profile	default	Finance_INT_EPG	Finance_INT_EPG
☑	EPG	default	WEB-SRV	WEB-SRV
	Add new variable			

Login to the APIC by Postman



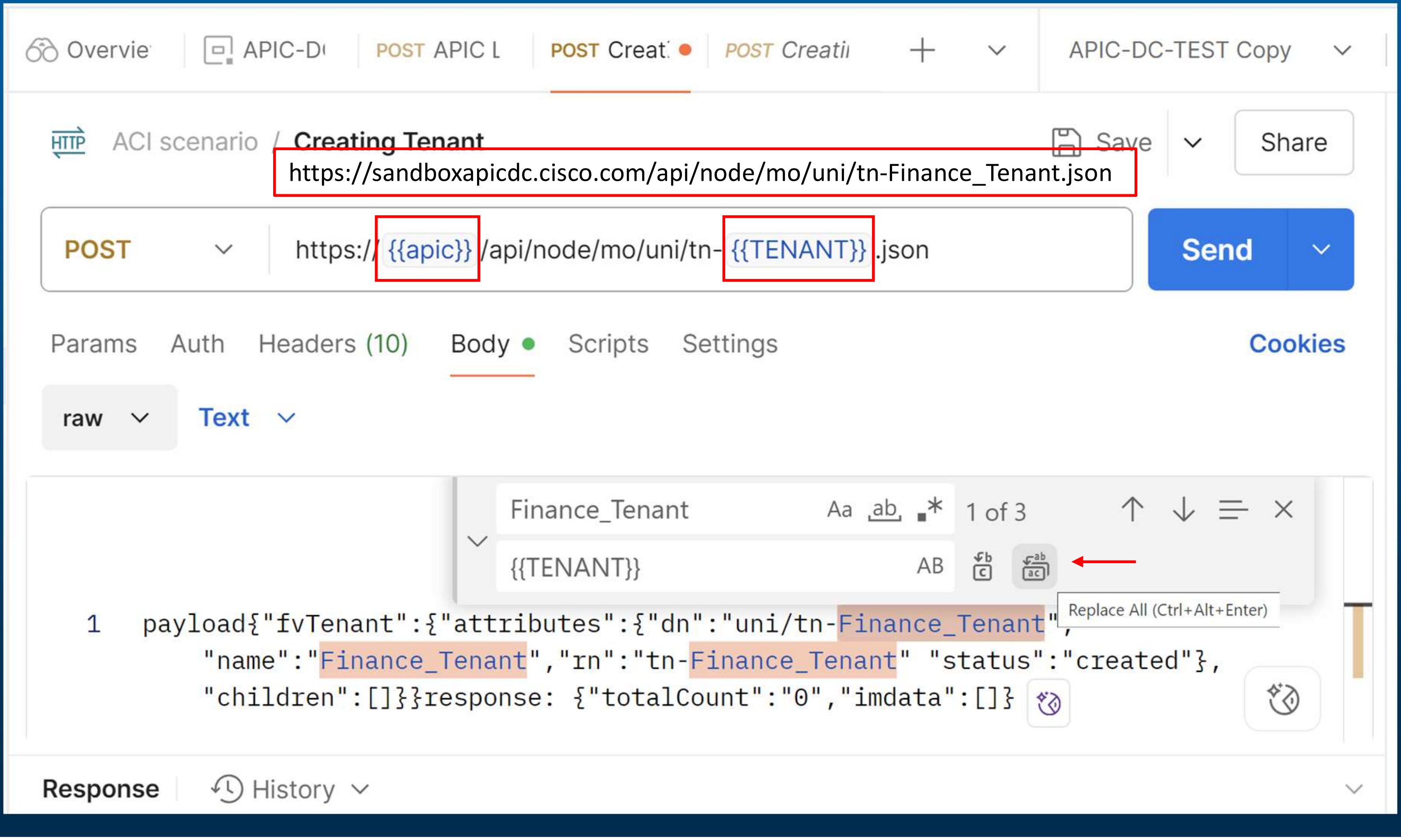
POST https:// {{apic}} /api/aaaLogin.json

```
{ "aaaUser" : { "attributes": {"name":"{{username}}","pwd":"{{password}}" } } }
```

200 OK · 899 ms · 2.42 KB

```
{
    "totalCount": "1",
    "imdata": [
        {
            "aaaLogin": {
                "attributes": {
                    "token":
                        "eyJhbGciOiJSUzI1NiIsImtpZCI6Imx3c2hwdjUyZDk4NnpqYXN1c
```

Creating a Tenant with REST API



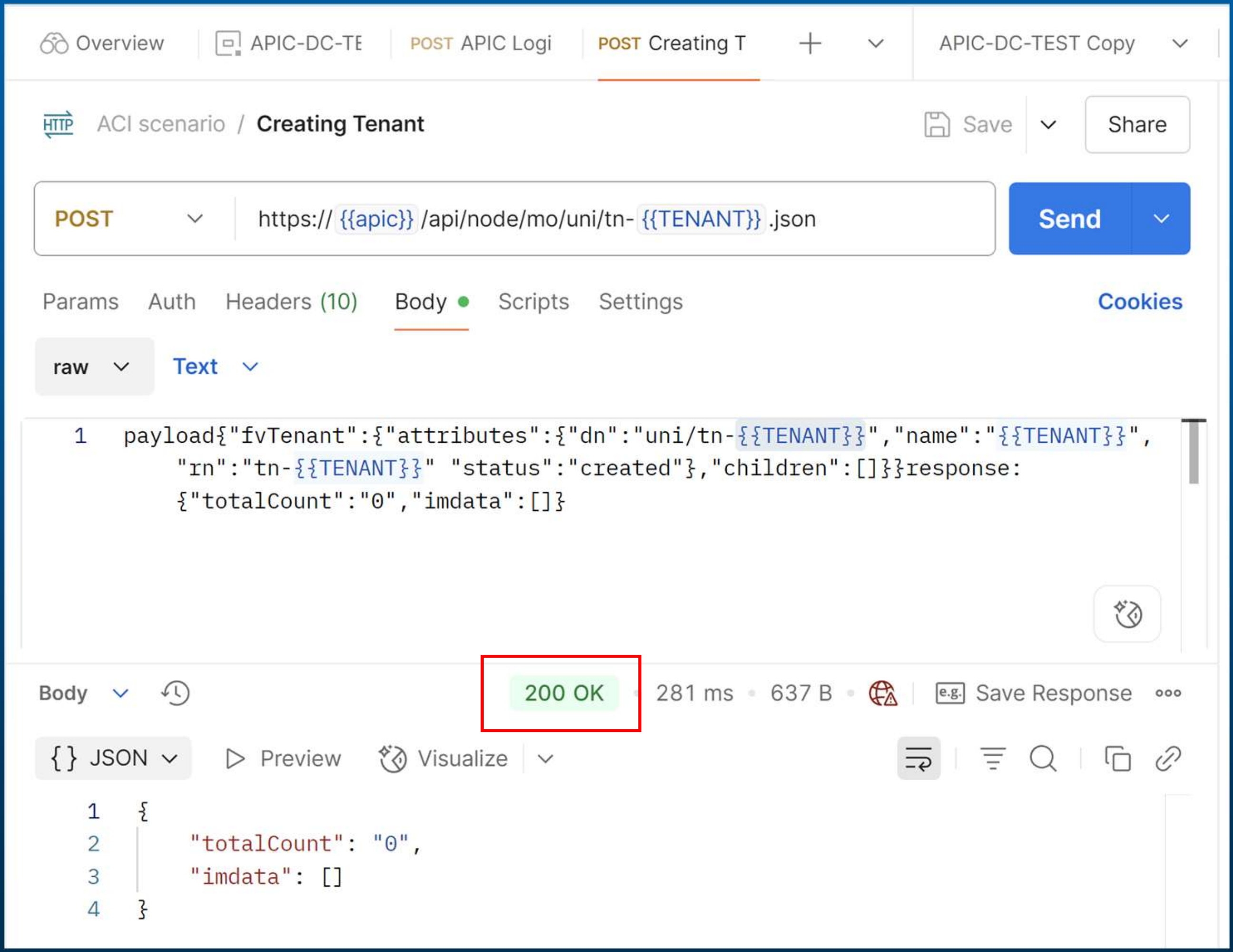
https://sandboxapicdc.cisco.com/api/node/mo/uni/tn-Finance_Tenant.json

POST https://{{apic}}/api/node/mo/uni/tn-{{TENANT}}.json

Finance_Tenant

{{TENANT}}

```
payload{"fvTenant":{"attributes":{"dn":"uni/tn-Finance_Tenant",
    "name":"Finance_Tenant","rn":"tn-Finance_Tenant" "status":"created"},
    "children":[]}}response: {"totalCount":"0","imdata":[]}
```

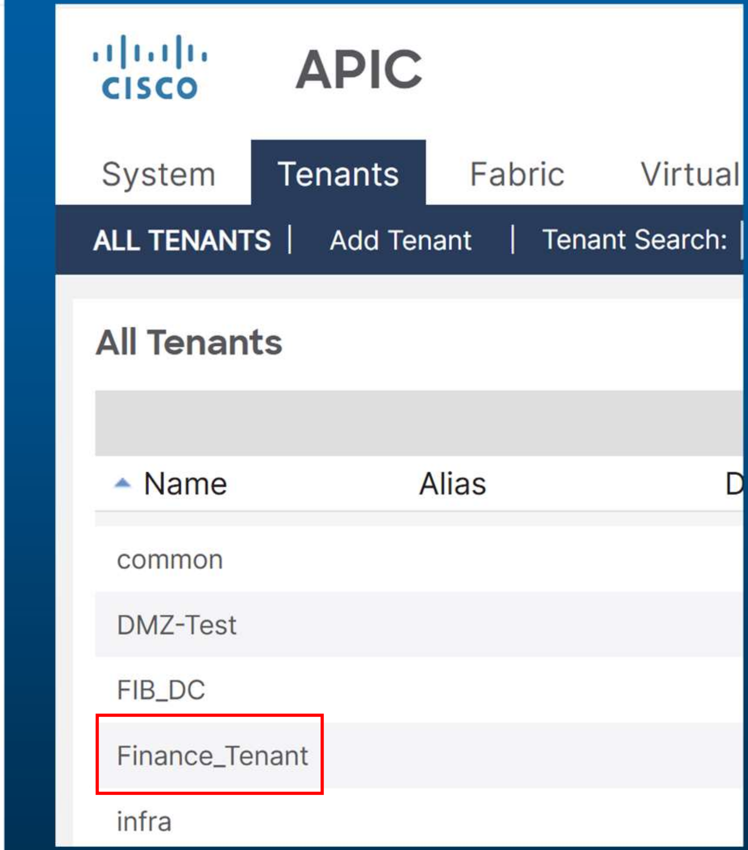


POST https:// {{apic}} /api/node/mo/uni/tn- {{TENANT}} .json

```
payload{"fvTenant":{"attributes":{"dn":"uni/tn-{{TENANT}}","name":"{{TENANT}}",
    "rn":"tn-{{TENANT}}" "status":"created"},"children":[]}}response:
    {"totalCount":"0","imdata":[]}
```

200 OK • 281 ms • 637 B

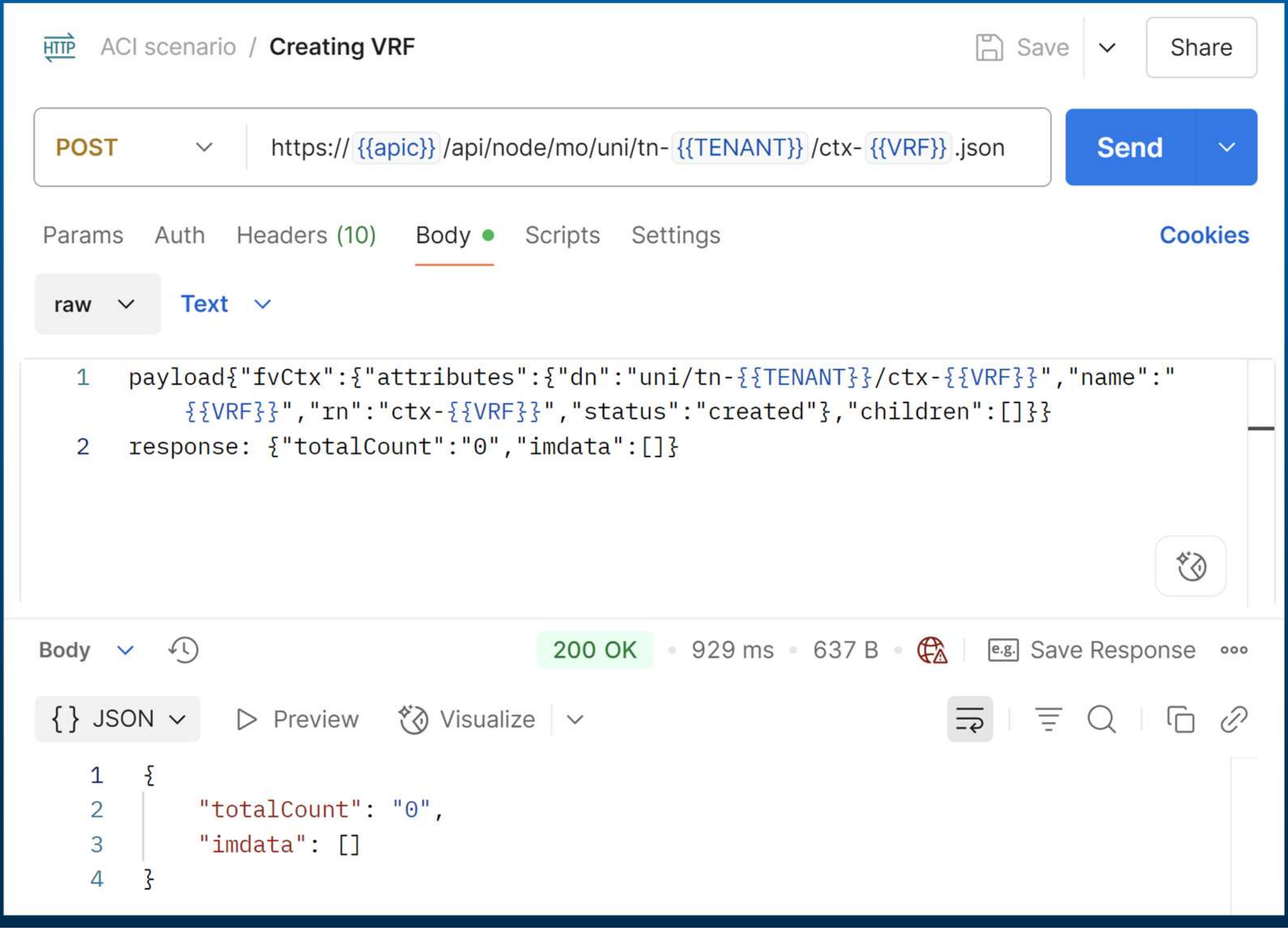
```
{
    "totalCount": "0",
    "imdata": []
}
```



All Tenants

Name	Alias	D
common		
DMZ-Test		
FIB_DC		
Finance_Tenant		
infra		

Creating a VRF

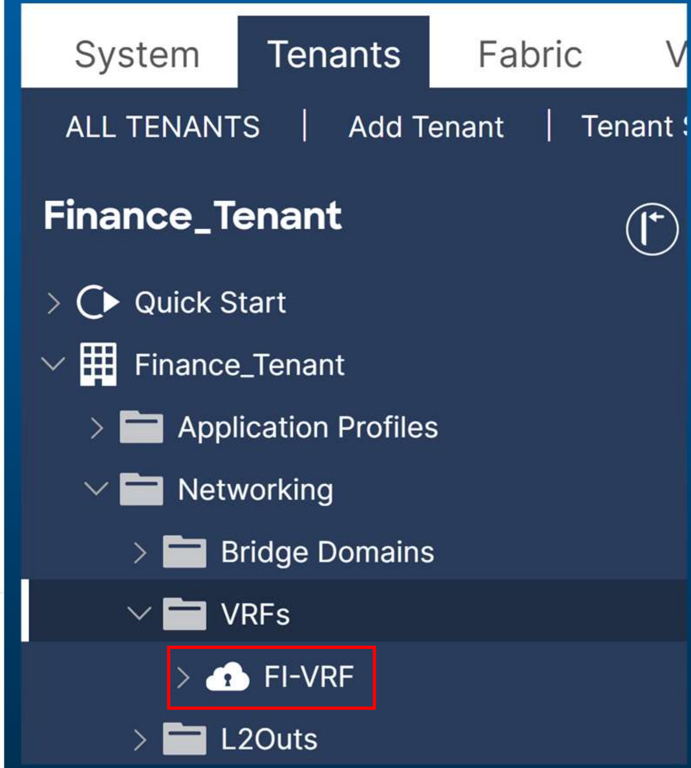


POST https:// {{apic}} /api/node/mo/uni/tn- {{TENANT}} /ctx- {{VRF}} .json

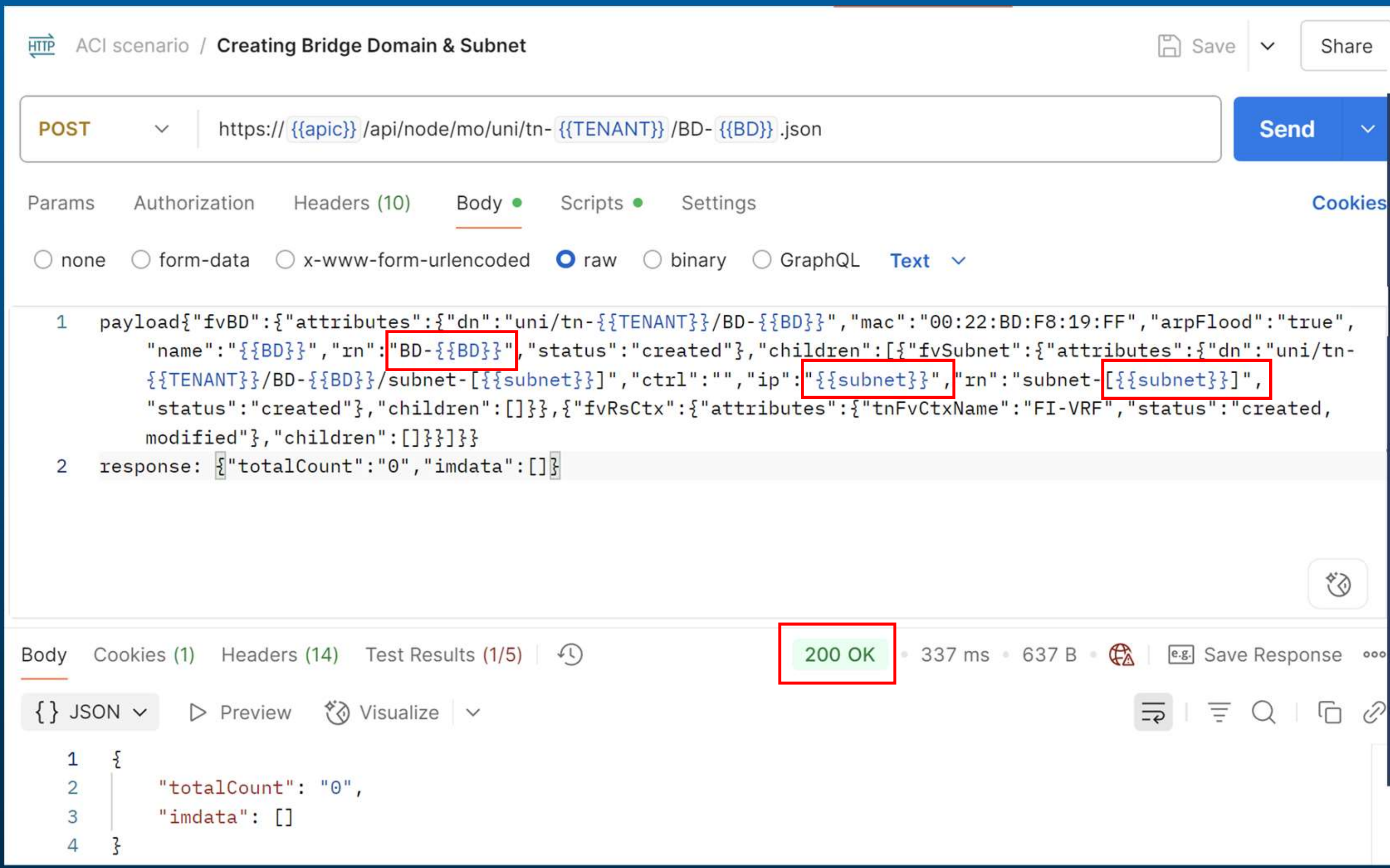
```
payload{"fvCtx":{"attributes":{"dn":"uni/tn-{{TENANT}}/ctx-{{VRF}}","name":"{{VRF}}","rn":"ctx-{{VRF}}","status":"created"},"children":[]}}
response: {"totalCount":"0","imdata":[]}
```

200 OK • 929 ms • 637 B

```
{
    "totalCount": "0",
    "imdata": []
}
```



Creating a Bridge Domain & Subnet



ACI scenario / **Creating Bridge Domain & Subnet**

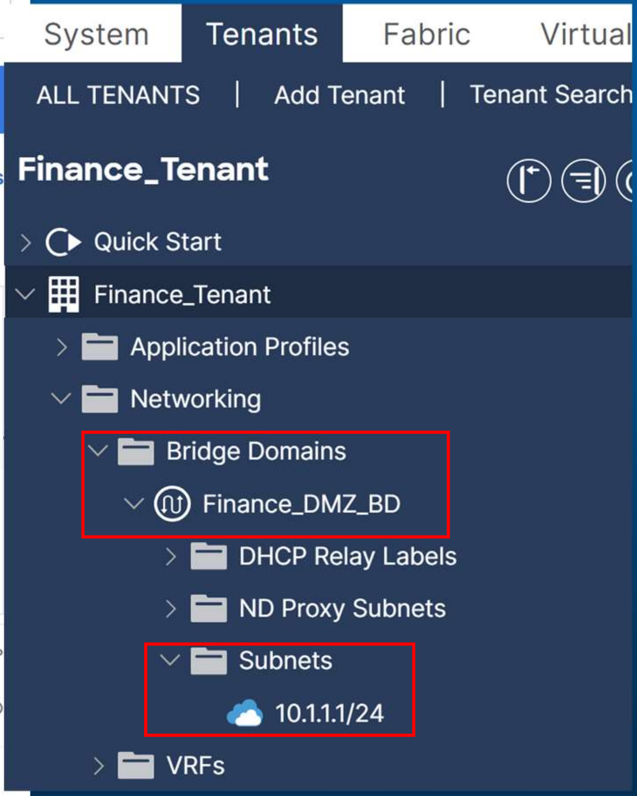
POST https://{{apic}}/api/node/mo/uni/tn-{{TENANT}}/BD-{{BD}}.json

○ none ○ form-data ○ x-www-form-urlencoded ● raw ○ binary ○ GraphQL Text

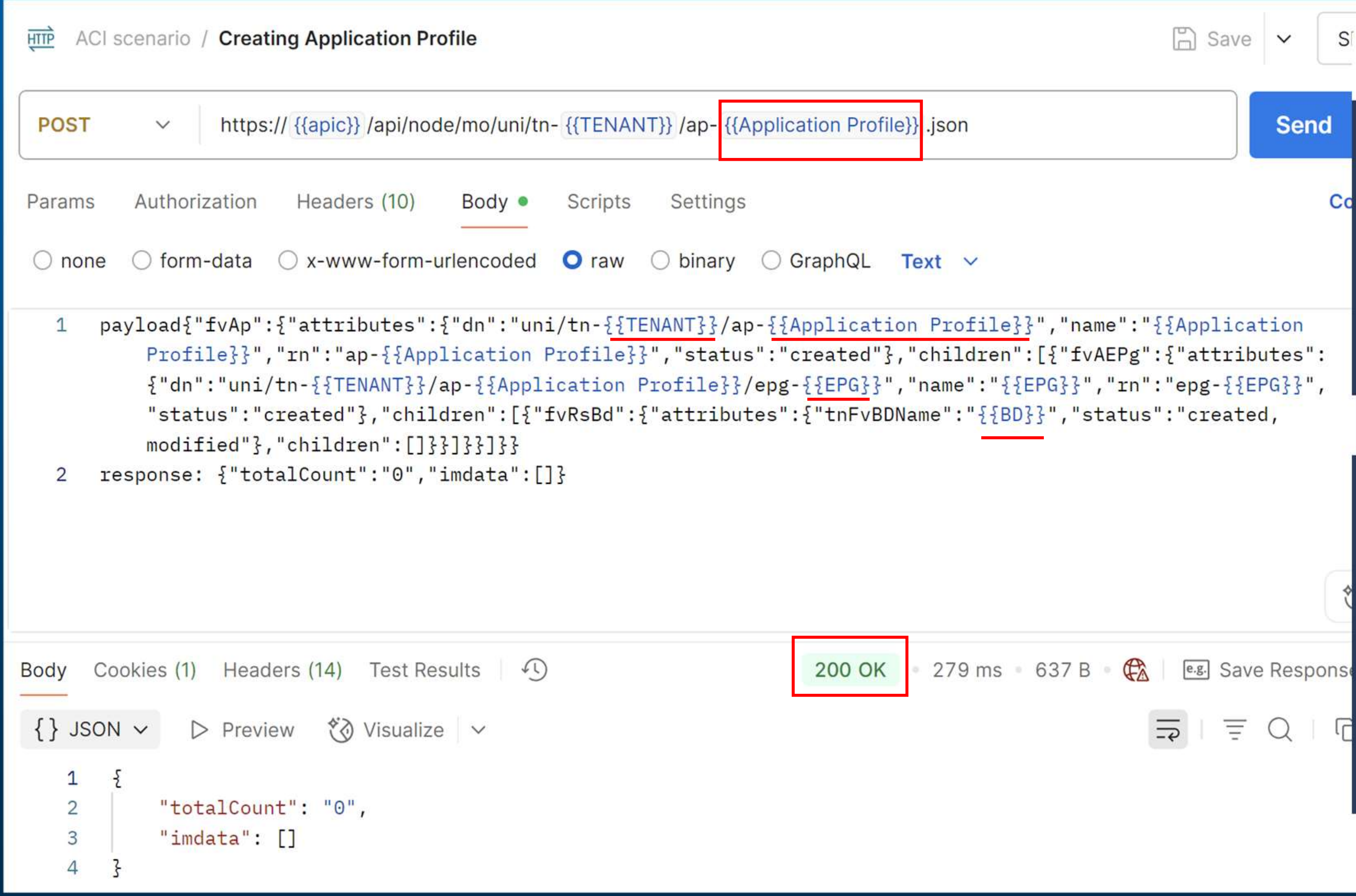
```
payload{"fvBD":{"attributes":{"dn":"uni/tn-{{TENANT}}/BD-{{BD}}","mac":"00:22:BD:F8:19:FF","arpFlood":"true",
    "name":"{{BD}}","rn":"BD-{{BD}}","status":"created"},"children":[{"fvSubnet":{"attributes":{"dn":"uni/tn-
    {{TENANT}}/BD-{{BD}}/subnet-[{{subnet}}]","ctrl":"","ip":"{{subnet}}","rn":"subnet-[{{subnet}}]",
    "status":"created"},"children":[]}},{"fvRsCtx":{"attributes":{"tnFvCtxName":"FI-VRF","status":"created,
    modified"},"children":[]}}]}}
response: {"totalCount":"0","imdata":[]}
```

200 OK · 337 ms · 637 B

```
{
    "totalCount": "0",
    "imdata": []
}
```



Creating an Application Profile & EPG



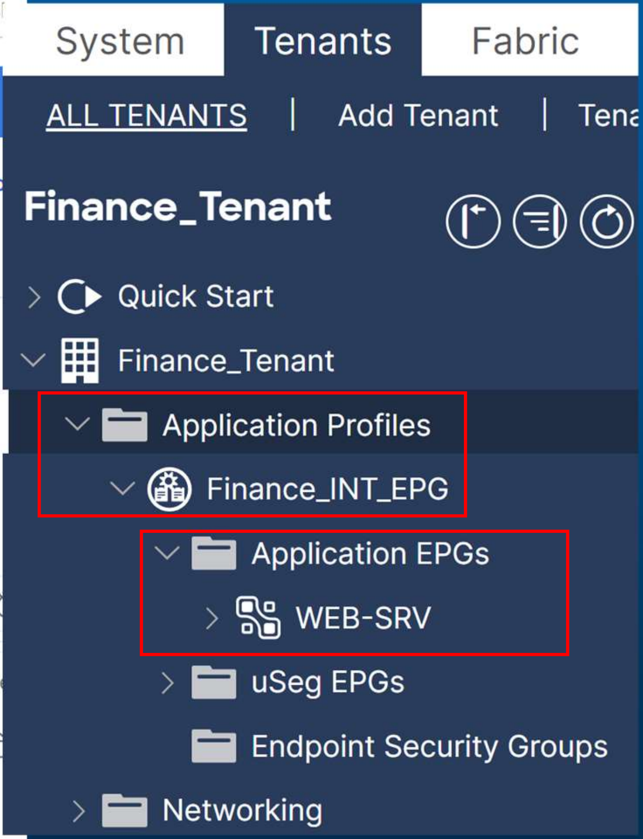
ACI scenario / Creating Application Profile

POST https://{{apic}}/api/node/mo/uni/tn-{{TENANT}}/ap-{{Application Profile}}.json

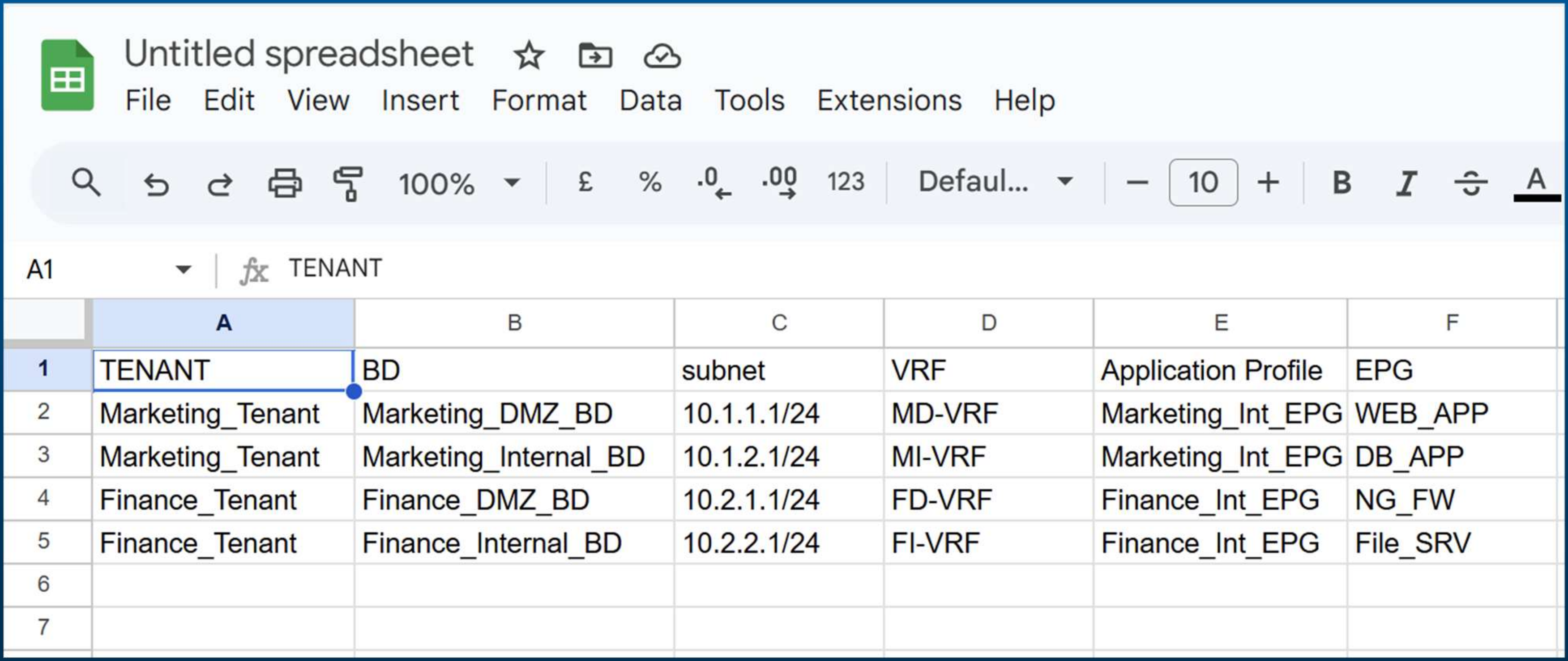
Save
Send
Params
Authorization
Headers (10)
Body
Scripts
Settings
○ none ○ form-data ○ x-www-form-urlencoded ● raw ○ binary ○ GraphQL Text

```
payload{"fvAp":{"attributes":{"dn":"uni/tn-{{TENANT}}/ap-{{Application Profile}}","name":"{{Application Profile}}","rn":"ap-{{Application Profile}}","status":"created"},"children":[{"fvAEPg":{"attributes":{"dn":"uni/tn-{{TENANT}}/ap-{{Application Profile}}/epg-{{EPG}}","name":"{{EPG}}","rn":"epg-{{EPG}}","status":"created"},"children":[{"fvRsBd":{"attributes":{"tnFvBDName":"{{BD}}","status":"created,modified"},"children":[]}}]}}]}}
response: {"totalCount":"0","imdata":[]}
```

```
{
    "totalCount": "0",
    "imdata": []
}
```

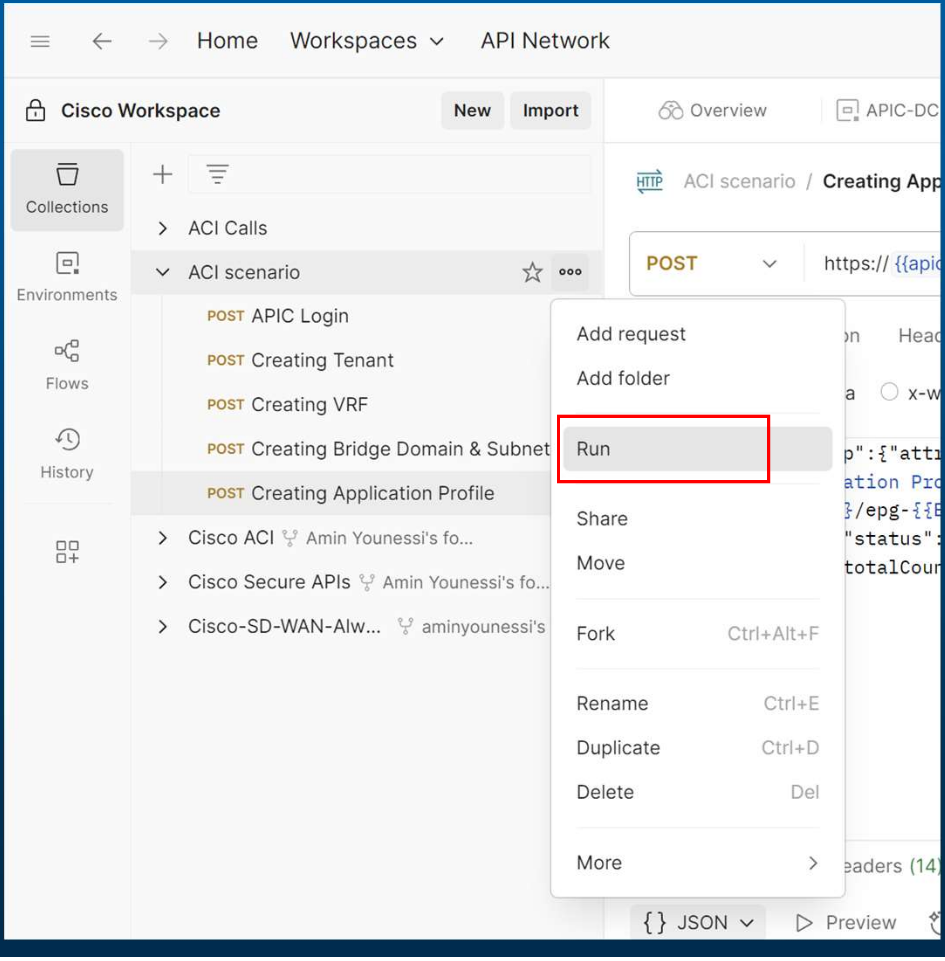


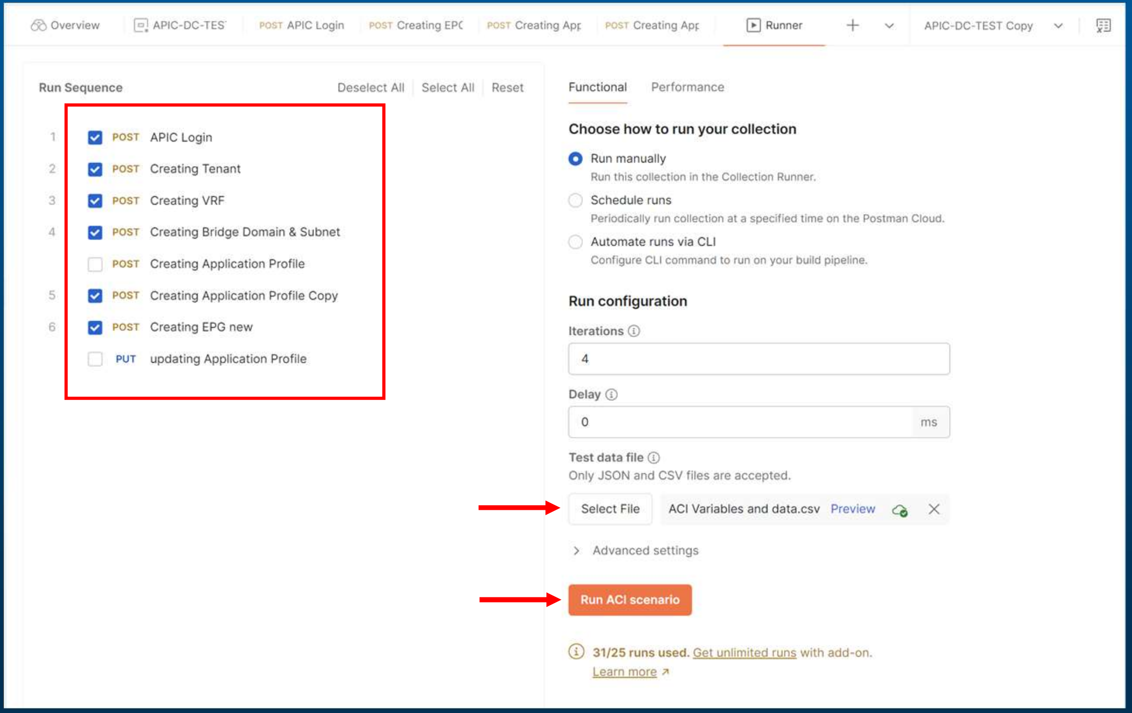
Lets make a .CSV file



	A	B	C	D	E	F
1	TENANT	BD	subnet	VRF	Application Profile	EPG
2	Marketing_Tenant	Marketing_DMZ_BD	10.1.1.1/24	MD-VRF	Marketing_Int_EPG	WEB_APP
3	Marketing_Tenant	Marketing_Internal_BD	10.1.2.1/24	MI-VRF	Marketing_Int_EPG	DB_APP
4	Finance_Tenant	Finance_DMZ_BD	10.2.1.1/24	FD-VRF	Finance_Int_EPG	NG_FW
5	Finance_Tenant	Finance_Internal_BD	10.2.2.1/24	FI-VRF	Finance_Int_EPG	File_SRV
6						
7						

Add the .CSV file into the Runner





Run Sequence

1 ☑ POST APIC Login
2 ☑ POST Creating Tenant
3 ☑ POST Creating VRF
4 ☑ POST Creating Bridge Domain & Subnet
☐ POST Creating Application Profile
5 ☑ POST Creating Application Profile Copy
6 ☑ POST Creating EPG new
☐ PUT updating Application Profile

Choose how to run your collection

● Run manually
Run this collection in the Collection Runner.

○ Schedule runs
Periodically run collection at a specified time on the Postman Cloud.

○ Automate runs via CLI
Configure CLI command to run on your build pipeline.

Run configuration

Iterations: 4

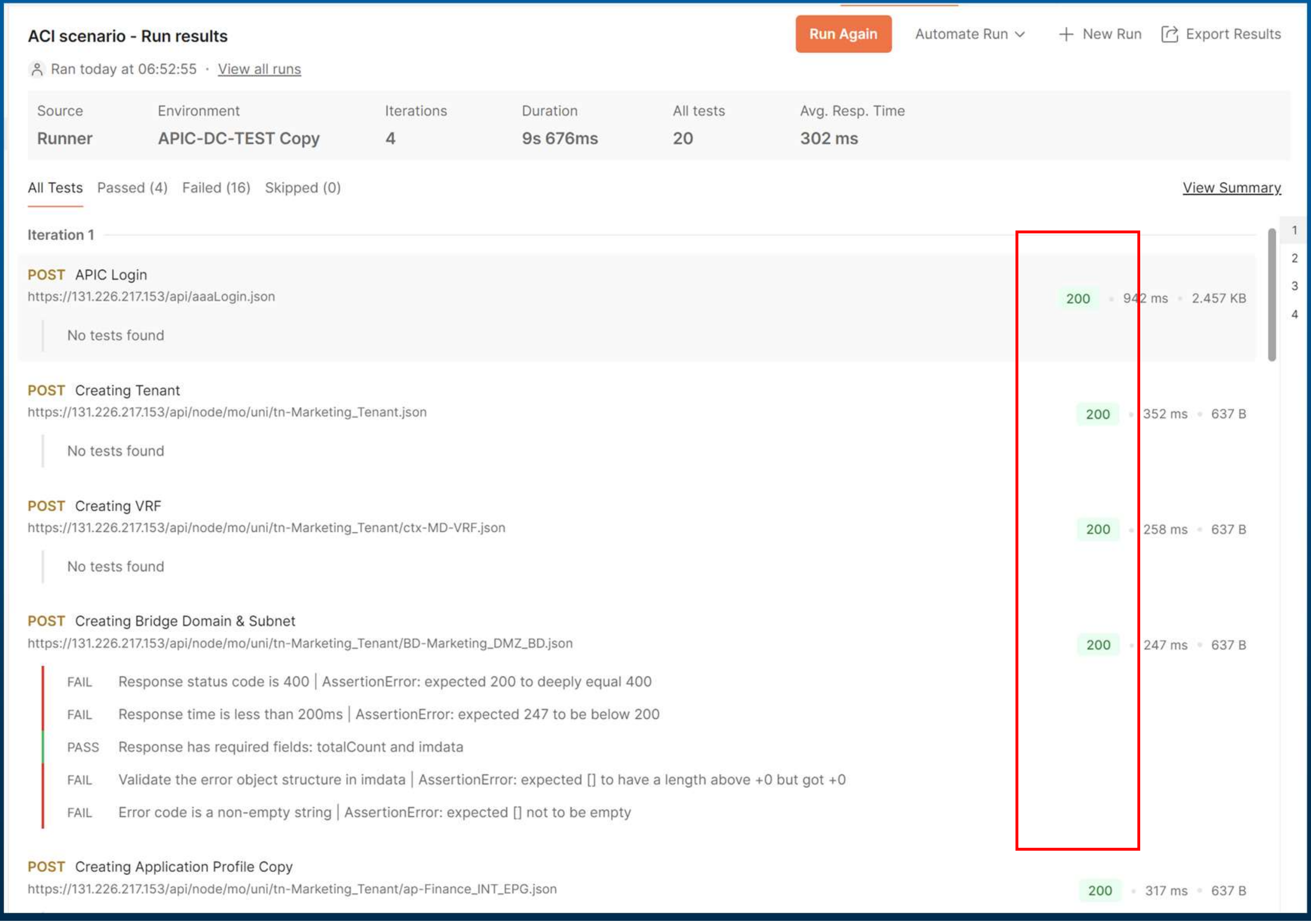
Delay: 0 ms

Test data file
Only JSON and CSV files are accepted.

ACI Variables and data.csv

31/25 runs used. Get unlimited runs with add-on.
Learn more

Run results



ACI scenario - Run results

Ran today at 06:52:55 · View all runs

Source	Environment	Iterations	Duration	All tests	Avg. Resp. Time
Runner	APIC-DC-TEST Copy	4	9s 676ms	20	302 ms

All Tests Passed (4) Failed (16) Skipped (0)

Iteration 1

POST APIC Login
https://131.226.217.153/api/aaaLogin.json
200 · 942 ms · 2.457 KB

No tests found

POST Creating Tenant
https://131.226.217.153/api/node/mo/uni/tn-Marketing_Tenant.json
200 · 352 ms · 637 B

No tests found

POST Creating VRF
https://131.226.217.153/api/node/mo/uni/tn-Marketing_Tenant/ctx-MD-VRF.json
200 · 258 ms · 637 B

No tests found

POST Creating Bridge Domain & Subnet
https://131.226.217.153/api/node/mo/uni/tn-Marketing_Tenant/BD-Marketing_DMZ_BD.json
200 · 247 ms · 637 B

FAIL Response status code is 400 | AssertionError: expected 200 to deeply equal 400

FAIL Response time is less than 200ms | AssertionError: expected 247 to be below 200

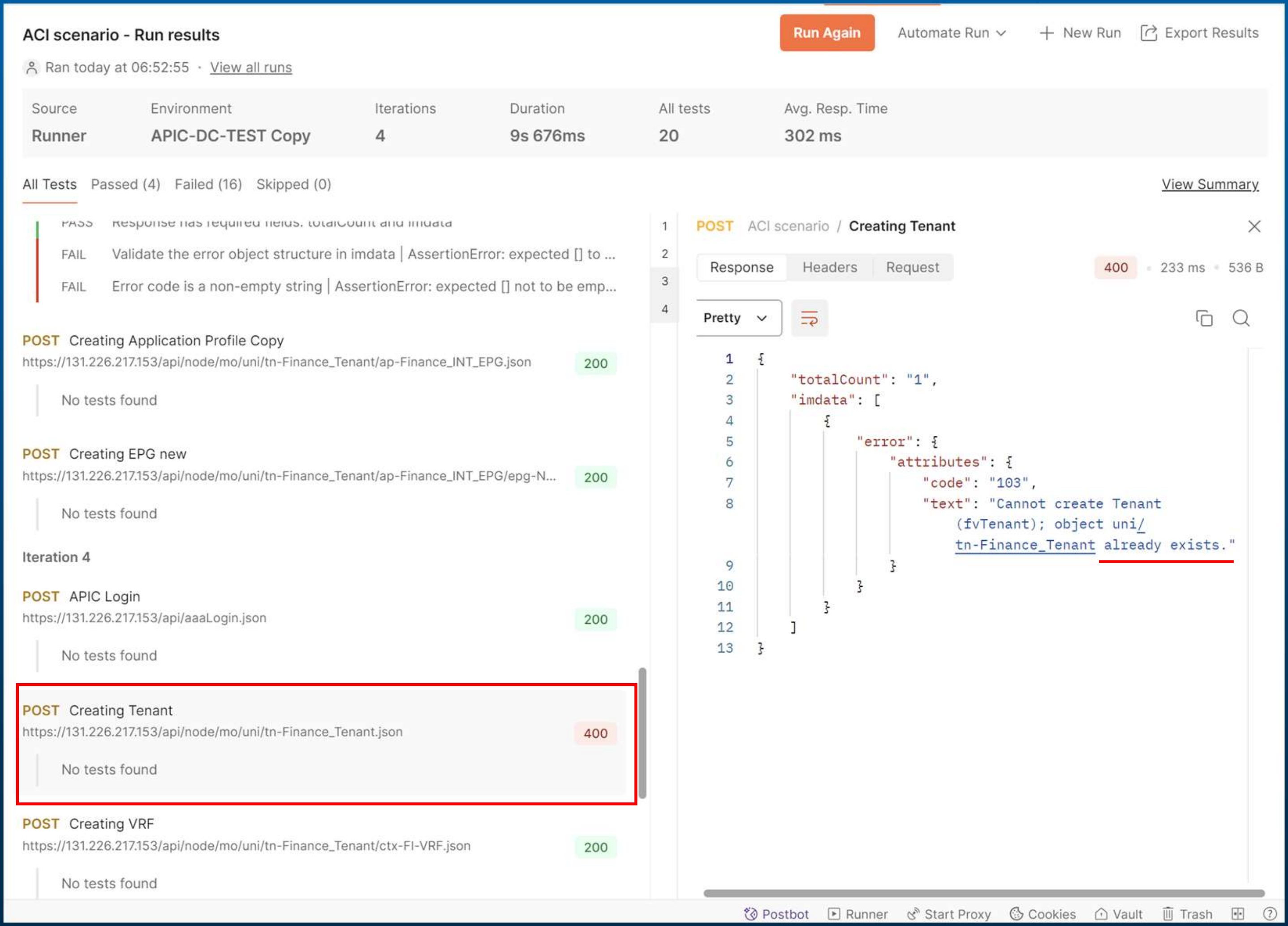
PASS Response has required fields: totalCount and imdata

FAIL Validate the error object structure in imdata | AssertionError: expected [] to have a length above +0 but got +0

FAIL Error code is a non-empty string | AssertionError: expected [] not to be empty

POST Creating Application Profile Copy
https://131.226.217.153/api/node/mo/uni/tn-Marketing_Tenant/ap-Finance_INT_EPG.json
200 · 317 ms · 637 B

Run results



ACI scenario - Run results

Ran today at 06:52:55 · View all runs

Source	Environment	Iterations	Duration	All tests	Avg. Resp. Time
Runner	APIC-DC-TEST Copy	4	9s 676ms	20	302 ms

PASS Response has required fields: totalCount and imdata

FAIL Validate the error object structure in imdata | AssertionError: expected [] to ...

FAIL Error code is a non-empty string | AssertionError: expected [] not to be emp...

POST Creating Application Profile Copy
https://131.226.217.153/api/node/mo/uni/tn-Finance_Tenant/ap-Finance_INT_EPG.json 200

No tests found

POST Creating EPG new
https://131.226.217.153/api/node/mo/uni/tn-Finance_Tenant/ap-Finance_INT_EPG/epg-N... 200

No tests found

Iteration 4

POST APIC Login
https://131.226.217.153/api/aaaLogin.json 200

No tests found

POST Creating Tenant
https://131.226.217.153/api/node/mo/uni/tn-Finance_Tenant.json 400

No tests found

POST Creating VRF
https://131.226.217.153/api/node/mo/uni/tn-Finance_Tenant/ctx-FI-VRF.json 200

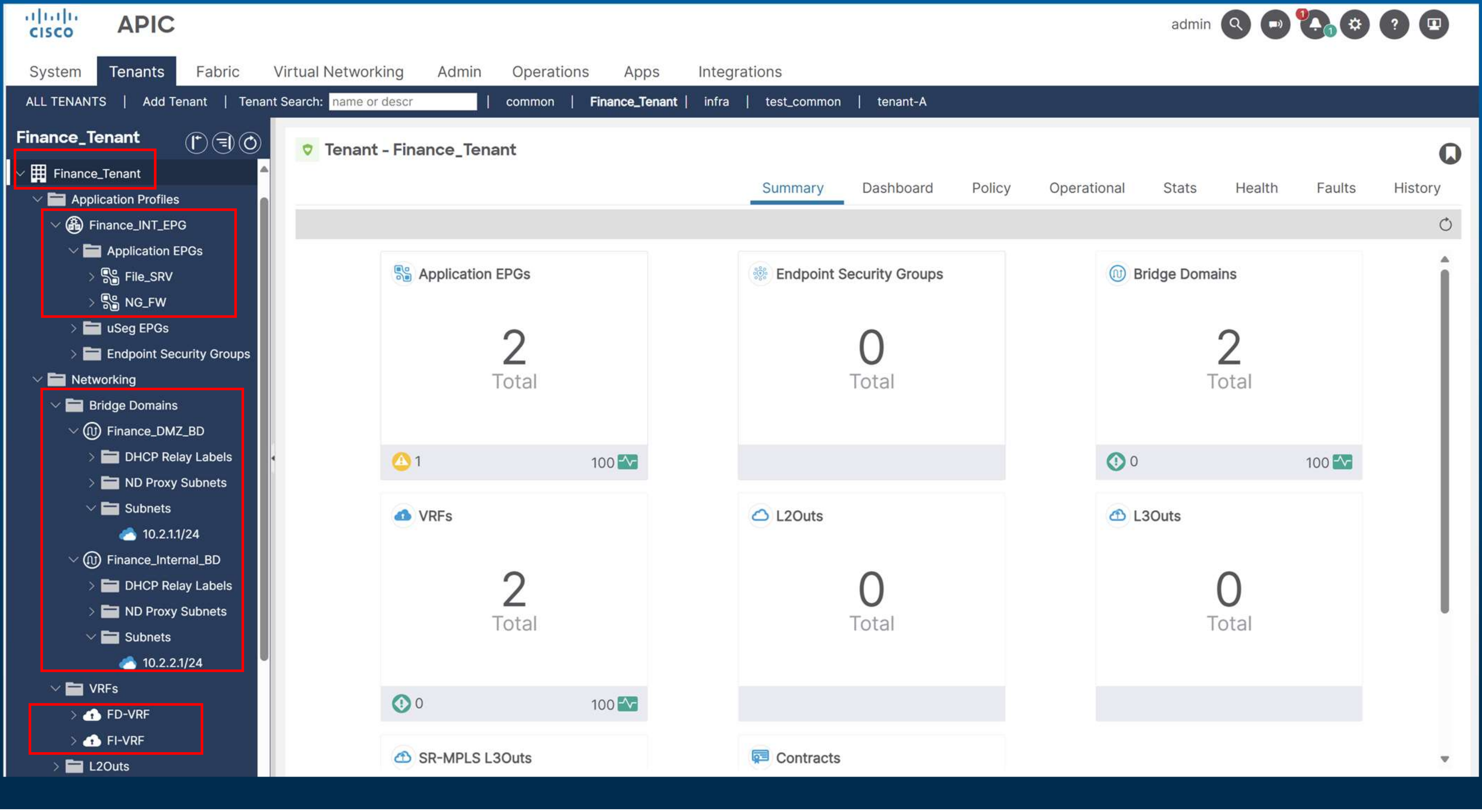
No tests found

POST ACI scenario / Creating Tenant

400 · 233 ms · 536 B

```
{
    "totalCount": "1",
    "imdata": [
        {
            "error": {
                "attributes": {
                    "code": "103",
                    "text": "Cannot create Tenant
                        (fvTenant); object uni/
                        tn-Finance_Tenant already exists."
                }
            }
        }
    ]
}
```

Verify the configuration from GUI



Finance_Tenant

- Finance_Tenant
  - Application Profiles
    - Finance_INT_EPG
      - Application EPGs
        - File_SRV
        - NG_FW
      - uSeg EPGs
      - Endpoint Security Groups
  - Networking
    - Bridge Domains
      - Finance_DMZ_BD
        - DHCP Relay Labels
        - ND Proxy Subnets
        - Subnets
          - 10.2.1.1/24
      - Finance_Internal_BD
        - DHCP Relay Labels
        - ND Proxy Subnets
        - Subnets
          - 10.2.2.1/24
    - VRFs
      - FD-VRF
      - FI-VRF
    - L2Outs

Tenant - Finance_Tenant

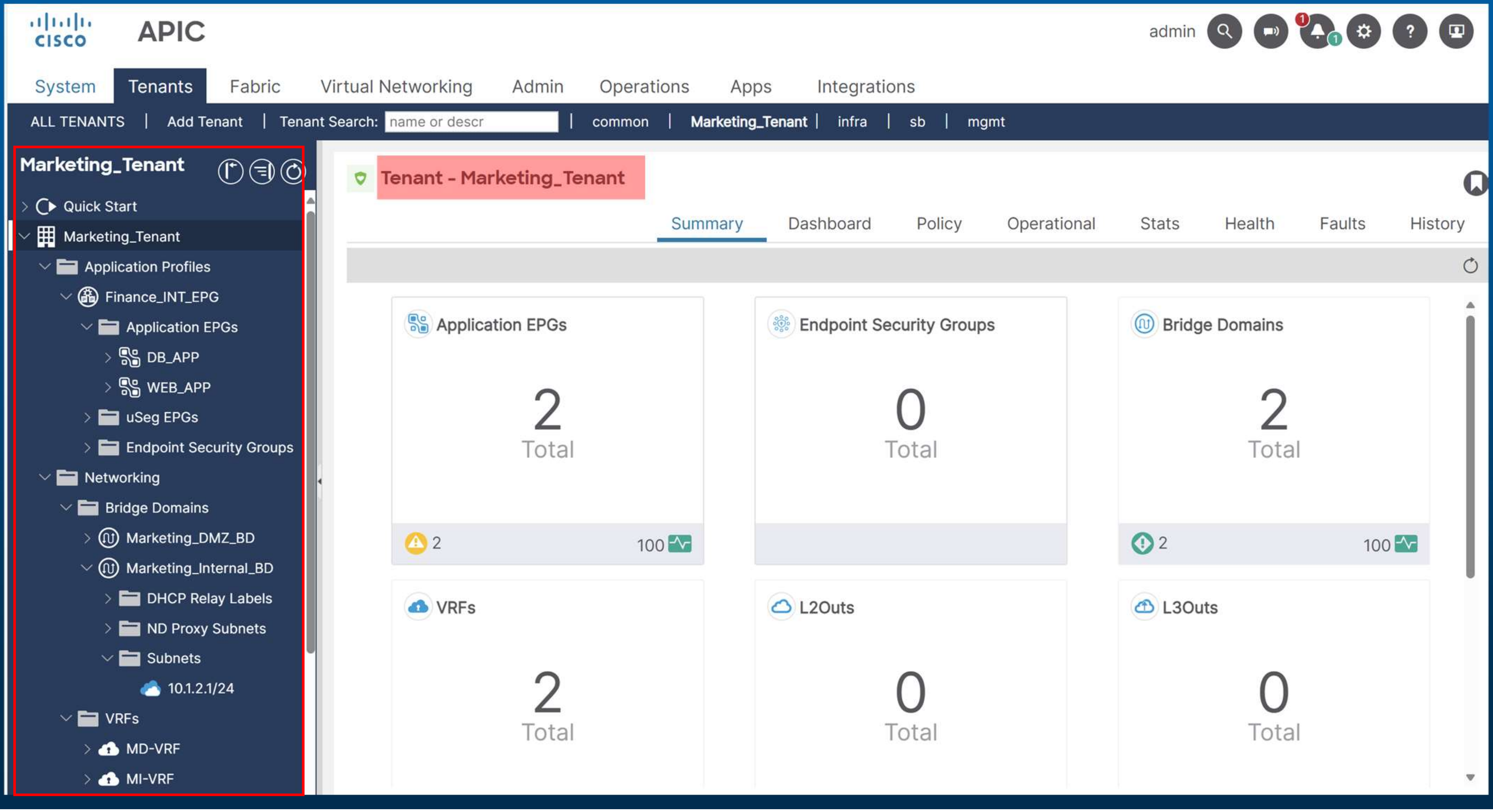
Application EPGs	Endpoint Security Groups	Bridge Domains
2 Total	0 Total	2 Total
⚠ 1 100		0 100

VRFs	L2Outs	L3Outs
2 Total	0 Total	0 Total
0 100		

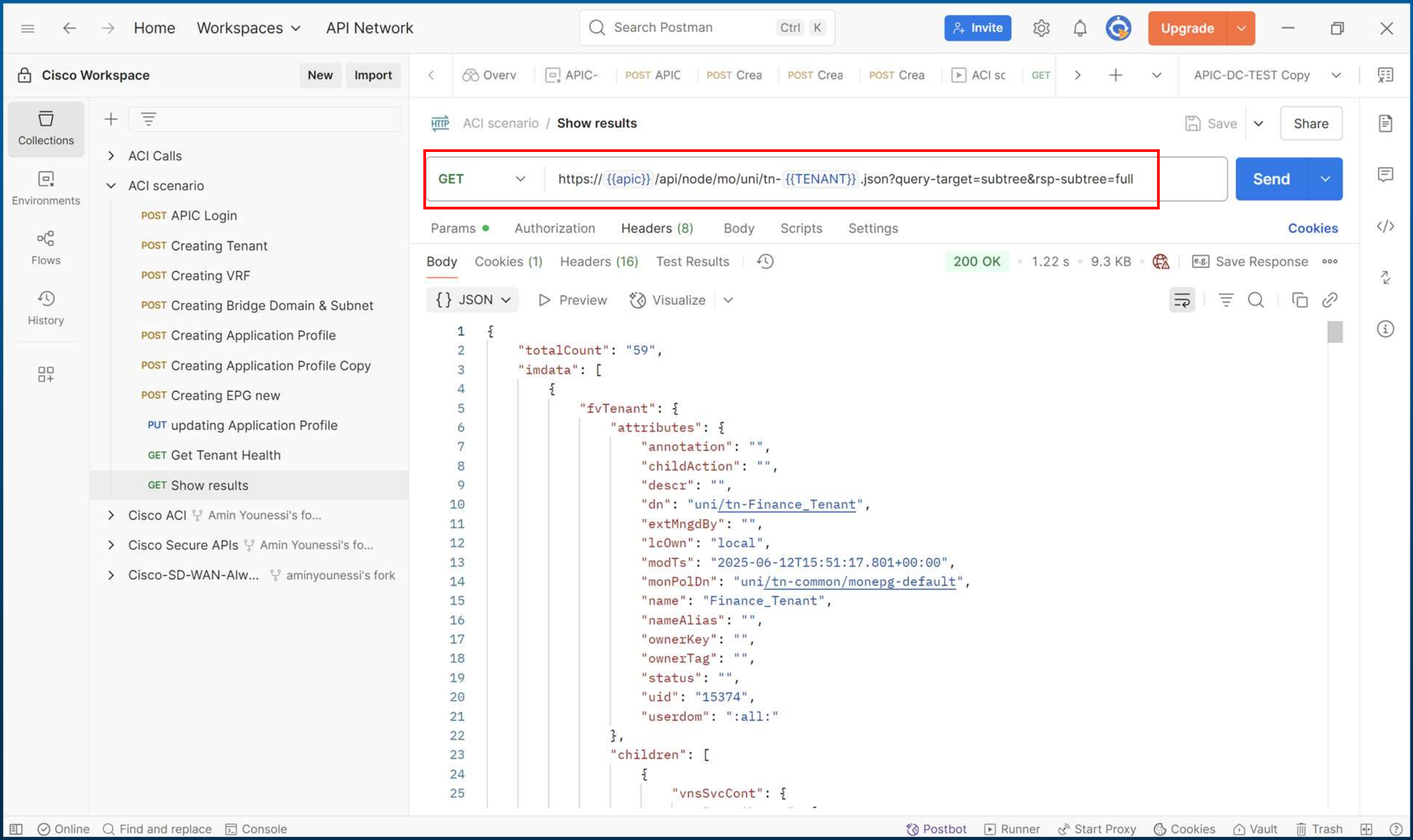
SR-MPLS L3Outs

Contracts

Verify the configuration from GUI

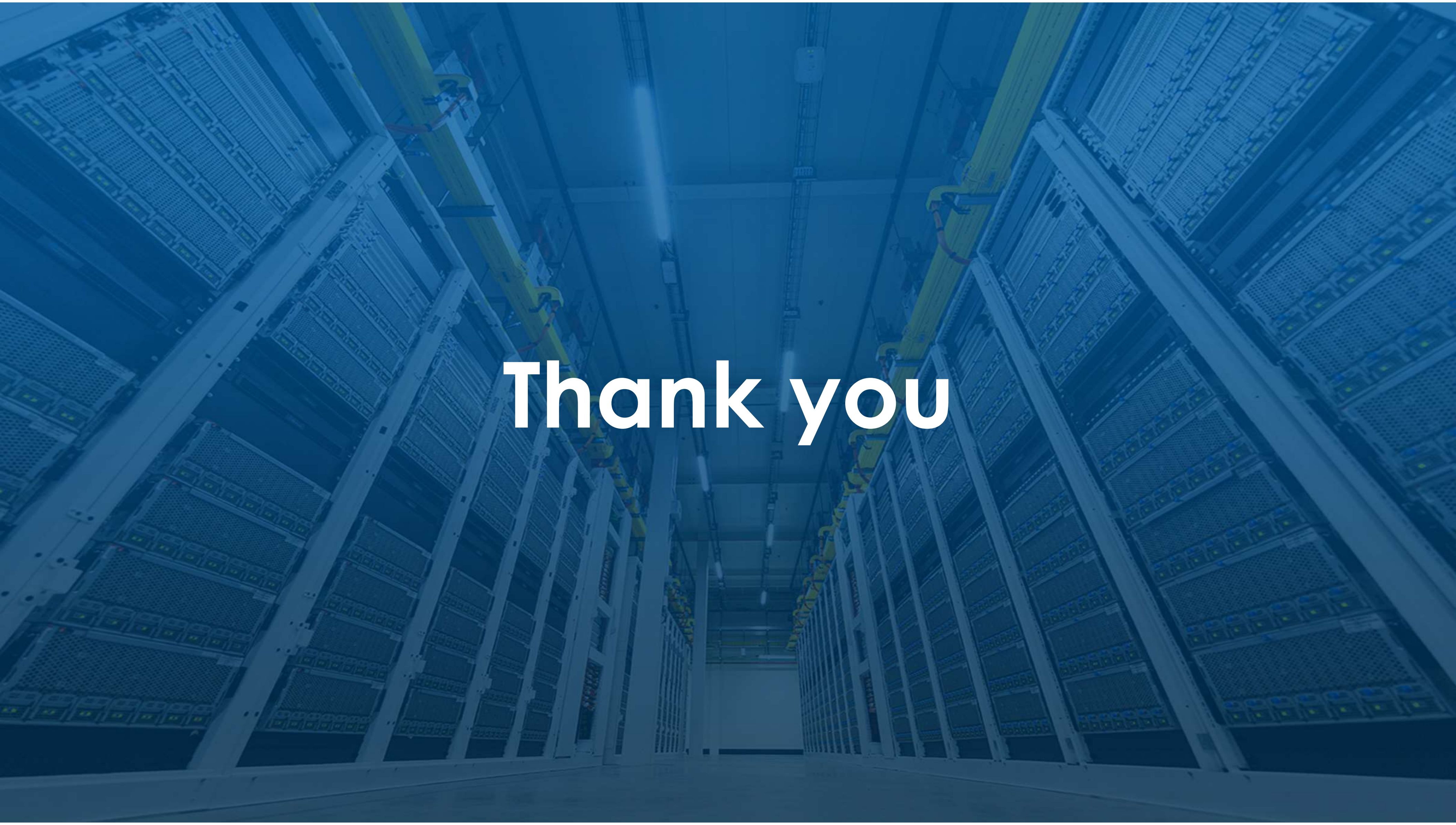


Verify from Postman by using GET method



GET https:// {{apic}} /api/node/mo/uni/tn- {{TENANT}} .json?query-target=subtree&rsp-subtree=full

```
{
    "totalCount": "59",
    "imdata": [
        {
            "fvTenant": {
                "attributes": {
                    "annotation": "",
                    "childAction": "",
                    "descr": "",
                    "dn": "uni/tn-Finance_Tenant",
                    "extMngdBy": "",
                    "lcOwn": "local",
                    "modTs": "2025-06-12T15:51:17.801+00:00",
                    "monPolDn": "uni/tn-common/monepg-default",
                    "name": "Finance_Tenant",
                    "nameAlias": "",
                    "ownerKey": "",
                    "ownerTag": "",
                    "status": "",
                    "uid": "15374",
                    "userdom": ":all:"
                },
                "children": [
                    {
                        "vnsSvcCont": {
```



Thank you