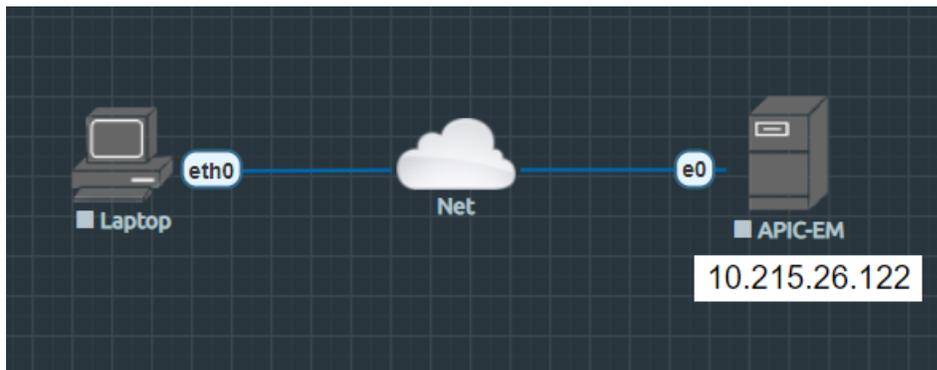# Lab: Sử dụng thư viện requests của Python khai thác API của Network Controller APIC-EM

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1. Sơ đồ Lab

Sơ đồ lab yêu cầu máy tính cá nhân có kết nối Internet và VPN đến trung tâm VnPro để truy cập Network Controller APIC-EM do VnPro cung cấp.

Thông tin truy cập APIC-EM:

IP: http://10.215.26.122/

Username: admin

Pass: vnpro@149

2. Làm Lab

Bước 1: Vào **CMD** Cài thư viện requests bằng câu lệnh: **pip install requests** như hình bên dưới:

Bước 2: Vào VS code hoặc các công cụ Edit code khác để viết code. Mình dùng vscode nên mình sẽ minh họa bằng vscode. Đầu tiên ta sẽ import thư viện requests vừa cài để sử dụng các hàm của nó.

```python
import requests #Import thư viện
import json #Import thư viện JSON
```

Bước 3: Viết hàm lấy ticket. Cũng tương tự như trong Postman ta cần phải khai báo những thông số cần thiết để mới có thể gửi yêu cầu được. Sau đó chúng ta gọi lại hàm vừa viết. Ở đây nếu chúng ta muốn xem toàn bộ phản hồi của APIC-EM thì ta sẽ thêm dòng này " print(json.dumps(data)) "vào **[1]**

```python
def get_ticket(): #Khai báo tên hàm
    url = http://10.215.26.122/api/v1/ticket #Khai báo thông
tin địa chỉ nguồn truy cập lấy Ticket.
    header = {
        "content-type" : "application/json"
    }
    body = json.dumps({ #ép kiểu dict -> json
        "username": "admin",
        "password" : "vnpro@149"
    })

    #Lấy ticket
    responses = requests.post(url, headers = header, data=
body, verify= False) #thực hiện gửi yêu cầu tạo ticket và trả
về kết quả
    data = responses.json()
    [1] print(json.dumps(data, indent=4))
    ticket = data['response']['serviceTicket'] #Truy cập vào
dữ liệu bên trong để lấy ticket.
    print(ticket)
    return ticket
get_ticket()
```

Kết quả: Khi có chạy [1]:

```
{
    "response": {
        "serviceTicket": "ST-398-6Z33cvpDfqwvaCDfDYjE-cas",
        "idleTimeout": 1800,
        "sessionTimeout": 21600
    },
    "version": "1.0"
}
```

Kết quả hình khi có bên dưới là

```
{
    "response": {
        "serviceTicket": "ST-398-6Z33cvpDfqwvaCDfDYjE-cas",
        "idleTimeout": 1800,
        "sessionTimeout": 21600
    },
    "version": "1.0"
}
ST-398-6Z33cvpDfqwvaCDfDYjE-cas
```

Lưu ý: mỗi lần chạy thì server sẽ cấp lại seviceTicket sẽ được sử dụng trong khoảng thời gian xác định bằng sessionTimeout nên ticker sẽ được cập nhật liên tục.

Chúng ta sẽ sử dụng seviceTicket đã được lấy ở trên để xác thực phiên nên khi đó ta sẽ viết hàm để lấy danh sách thiết bị trong APIC-EM và truyền vào phần header từ khóa là **x-auth-token** như trong postman với giá trị là hàm **get_ticket().**

Bước 2: Viết hàm lấy danh sách thiết bị

```
def get_list_device():
    url1 = "http://10.215.26.122/api/v1/network-device"
    header = {
```

```python
        "x-auth-token": get_ticket()
    }
    #Lấy danh sách thiết bị
    responses_device = requests.get(url1, headers = header,
verify = False)
    print (responses_device)
    data = responses_device.json()
    print(json.dumps(data, indent = 4))
    return data
get_list_device()
```

Kết quả:

```json
{
    "response": [
        {
            "location": null,
            "type": "Cisco GatewayServer",
            "errorCode": "DEV-UNREACHED",
            "serialNumber": null,
            "family": "Routers",
            "errorDescription": "SNMP timeouts are occurring with this device. Either the
SNMP credentials are not correctly provided to controller or the device is responding
slow and snmp timeout is low. If its a timeout issue, controller will attempt to
progressively adjust the timeout in subsequent collection cycles to get device to
managed state. User can also run discovery again only for this device using the range
discovery feature after adjusting the timeout and snmp credentials as required.",
            "softwareVersion": "15.7(3)M2",
            "macAddress": "aa:bb:cc:00:3c:00",
            "series": "Other Routers",
            "lastUpdateTime": 1655265757999,
            "locationName": null,
```

        "tagCount": "0",

        "hostname": "R1.vnpro.org",

        "role": "CORE",

        "apManagerInterfaceIp": "",

        "bootDateTime": "2022-03-03 06:51:30",

        "collectionStatus": "Partial Collection Failure",

        "interfaceCount": "4",

        "lineCardCount": null,

        "lineCardId": null,

        "managementIpAddress": "10.215.26.245",

        "memorySize": "883975308",

        "platformId": null,

        "reachabilityFailureReason": "SNMP Connectivity Failed",

        "reachabilityStatus": "Unreachable",

        "snmpContact": "",

        "snmpLocation": "",

        "tunnelUdpPort": null,

        "lastUpdated": "2022-06-15 04:02:37",

        "inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

        "collectionInterval": "Global Default",

        "upTime": "0:21:47.81",

        "roleSource": "AUTO",

        "instanceUuid": "f097659f-d035-4d94-b3a7-9c937d72917b",

        "id": "f097659f-d035-4d94-b3a7-9c937d72917b"

    },

    {

        "location": null,

"type": "Cisco GatewayServer",

"errorCode": "DEV-UNREACHED",

"serialNumber": null,

"family": "Routers",

"errorDescription": "SNMP timeouts are occurring with this device. Either the SNMP credentials are not correctly provided to controller or the device is responding slow and snmp timeout is low. If its a timeout issue, controller will attempt to progressively adjust the timeout in subsequent collection cycles to get device to managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

"softwareVersion": "15.7(3)M2",

"macAddress": "aa:bb:cc:00:1c:00",

"series": "Other Routers",

"lastUpdateTime": 1655266698858,

"locationName": null,

"tagCount": "0",

"hostname": "R1.vnpro.vn",

"role": "CORE",

"apManagerInterfaceIp": "",

"bootDateTime": "2022-04-26 03:59:31",

"collectionStatus": "Partial Collection Failure",

"interfaceCount": "4",

"lineCardCount": null,

"lineCardId": null,

"managementIpAddress": "10.215.26.212",

"memorySize": "883975308",

"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

        "reachabilityStatus": "Unreachable",

        "snmpContact": "",

        "snmpLocation": "",

        "tunnelUdpPort": null,

        "lastUpdated": "2022-06-15 04:18:18",

        "inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

        "collectionInterval": "Global Default",

        "upTime": "4:30:45.54",

        "roleSource": "AUTO",

        "instanceUuid": "af28c8d3-89e6-439c-9ae7-50db7e6aa4bf",

        "id": "af28c8d3-89e6-439c-9ae7-50db7e6aa4bf"

    },

    {

        "location": null,

        "type": "Cisco GatewayServer",

        "errorCode": "DEV-UNREACHED",

        "serialNumber": null,

        "family": "Routers",

        "errorDescription": "SNMP timeouts are occurring with this device. Either the SNMP credentials are not correctly provided to controller or the device is responding slow and snmp timeout is low. If its a timeout issue, controller will attempt to progressively adjust the timeout in subsequent collection cycles to get device to managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

        "softwareVersion": "15.7(3)M2",

        "macAddress": "aa:bb:cc:00:25:00",

        "series": "Other Routers",

```
    "lastUpdateTime": 1655265631940,

    "locationName": null,

    "tagCount": "0",

    "hostname": "R2.vnpro.org",

    "role": "CORE",

    "apManagerInterfaceIp": "",

    "bootDateTime": "2022-03-03 07:35:35",

    "collectionStatus": "Partial Collection Failure",

    "interfaceCount": "5",

    "lineCardCount": null,

    "lineCardId": null,

    "managementIpAddress": "10.215.26.225",

    "memorySize": "883975308",

    "platformId": null,

    "reachabilityFailureReason": "SNMP Connectivity Failed",

    "reachabilityStatus": "Unreachable",

    "snmpContact": "",

    "snmpLocation": "",

    "tunnelUdpPort": null,

    "lastUpdated": "2022-06-15 04:00:31",

    "inventoryStatusDetail": "<status><general
code=\"DEV_UNREACHED\"/></status>",

    "collectionInterval": "Global Default",

    "upTime": "20:19:32.98",

    "roleSource": "AUTO",

    "instanceUuid": "c5a018e1-de6e-473d-ab09-7c7fc3d210fe",

    "id": "c5a018e1-de6e-473d-ab09-7c7fc3d210fe"
  },
```

```
{
    "location": null,
    "type": "Cisco GatewayServer",
    "errorCode": "DEV-UNREACHED",
    "serialNumber": null,
    "family": "Routers",
    "errorDescription": "SNMP timeouts are occurring with this device. Either the
SNMP credentials are not correctly provided to controller or the device is responding
slow and snmp timeout is low. If its a timeout issue, controller will attempt to
progressively adjust the timeout in subsequent collection cycles to get device to
managed state. User can also run discovery again only for this device using the range
discovery feature after adjusting the timeout and snmp credentials as required.",
    "softwareVersion": "15.7(3)M2",
    "macAddress": "aa:bb:cc:00:4b:00",
    "series": "Other Routers",
    "lastUpdateTime": 1655266277706,
    "locationName": null,
    "tagCount": "0",
    "hostname": "R4.tdtu2.vn",
    "role": "DISTRIBUTION",
    "apManagerInterfaceIp": "",
    "bootDateTime": "2022-04-21 14:15:32",
    "collectionStatus": "Partial Collection Failure",
    "interfaceCount": "4",
    "lineCardCount": null,
    "lineCardId": null,
    "managementIpAddress": "10.215.27.179",
    "memorySize": "883975308",
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"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

"reachabilityStatus": "Unreachable",

"snmpContact": "",

"snmpLocation": "",

"tunnelUdpPort": null,

"lastUpdated": "2022-06-15 04:11:17",

"inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

"collectionInterval": "Global Default",

"upTime": "1 day, 1:48:52.81",

"roleSource": "AUTO",

"instanceUuid": "adc0c9a3-03d1-4370-a11c-51ba50cf7964",

"id": "adc0c9a3-03d1-4370-a11c-51ba50cf7964"

},

{

"location": null,

"type": "Cisco GatewayServer",

"errorCode": "DEV-UNREACHED",

"serialNumber": null,

"family": "Routers",

"errorDescription": "SNMP timeouts are occurring with this device. Either the
SNMP credentials are not correctly provided to controller or the device is responding
slow and snmp timeout is low. If its a timeout issue, controller will attempt to
progressively adjust the timeout in subsequent collection cycles to get device to
managed state. User can also run discovery again only for this device using the range
discovery feature after adjusting the timeout and snmp credentials as required.",

"softwareVersion": "15.7(3)M2",

"macAddress": "aa:bb:cc:00:12:00",

"series": "Other Routers",

"lastUpdateTime": 1655265739192,

"locationName": null,

"tagCount": "0",

"hostname": "Rdemo1-vnpro.vnpro.vn",

"role": "DISTRIBUTION",

"apManagerInterfaceIp": "",

"bootDateTime": "2022-03-30 01:50:16",

"collectionStatus": "Partial Collection Failure",

"interfaceCount": "5",

"lineCardCount": null,

"lineCardId": null,

"managementIpAddress": "10.215.26.233",

"memorySize": "883975308",

"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

"reachabilityStatus": "Unreachable",

"snmpContact": "",

"snmpLocation": "",

"tunnelUdpPort": null,

"lastUpdated": "2022-06-15 04:02:19",

"inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

"collectionInterval": "Global Default",

"upTime": "11:13:45.69",

"roleSource": "AUTO",

"instanceUuid": "787979db-db54-4dd9-90e3-88677d0504a6",

```
      "id": "787979db-db54-4dd9-90e3-88677d0504a6"
   },
   {
      "location": null,
      "type": "Cisco GatewayServer",
      "errorCode": "DEV-UNREACHED",
      "serialNumber": null,
      "family": "Routers",
      "errorDescription": "SNMP timeouts are occurring with this device. Either the
SNMP credentials are not correctly provided to controller or the device is responding
slow and snmp timeout is low. If its a timeout issue, controller will attempt to
progressively adjust the timeout in subsequent collection cycles to get device to
managed state. User can also run discovery again only for this device using the range
discovery feature after adjusting the timeout and snmp credentials as required.",
      "softwareVersion": "15.7(3)M2",
      "macAddress": "aa:bb:cc:00:22:00",
      "series": "Other Routers",
      "lastUpdateTime": 1655265749539,
      "locationName": null,
      "tagCount": "0",
      "hostname": "Rdemo2-demo.vnpro.vn",
      "role": "DISTRIBUTION",
      "apManagerInterfaceIp": "",
      "bootDateTime": "2022-03-30 01:50:37",
      "collectionStatus": "Partial Collection Failure",
      "interfaceCount": "4",
      "lineCardCount": null,
      "lineCardId": null,
```

"managementIpAddress": "10.215.26.234",

"memorySize": "883975308",

"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

"reachabilityStatus": "Unreachable",

"snmpContact": "",

"snmpLocation": "",

"tunnelUdpPort": null,

"lastUpdated": "2022-06-15 04:02:29",

"inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

"collectionInterval": "Global Default",

"upTime": "1:36:48.74",

"roleSource": "AUTO",

"instanceUuid": "4caf0135-a26f-4c86-926b-d9d0deb6dea0",

"id": "4caf0135-a26f-4c86-926b-d9d0deb6dea0"

},

{

"location": null,

"type": "Cisco GatewayServer",

"errorCode": "DEV-UNREACHED",

"serialNumber": null,

"family": "Routers",

"errorDescription": "SNMP timeouts are occurring with this device. Either the
SNMP credentials are not correctly provided to controller or the device is responding
slow and snmp timeout is low. If its a timeout issue, controller will attempt to
progressively adjust the timeout in subsequent collection cycles to get device to

managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

        "softwareVersion": "15.7(3)M2",

        "macAddress": "aa:bb:cc:00:32:00",

        "series": "Other Routers",

        "lastUpdateTime": 1655265803908,

        "locationName": null,

        "tagCount": "0",

        "hostname": "Rdemo3-vnpro.vnpro.vn",

        "role": "ACCESS",

        "apManagerInterfaceIp": "",

        "bootDateTime": "2022-03-30 01:50:59",

        "collectionStatus": "Partial Collection Failure",

        "interfaceCount": "5",

        "lineCardCount": null,

        "lineCardId": null,

        "managementIpAddress": "10.215.26.235",

        "memorySize": "883975308",

        "platformId": null,

        "reachabilityFailureReason": "SNMP Connectivity Failed",

        "reachabilityStatus": "Unreachable",

        "snmpContact": "",

        "snmpLocation": "",

        "tunnelUdpPort": null,

        "lastUpdated": "2022-06-15 04:03:23",

        "inventoryStatusDetail": "<status><general
code=\"DEV_UNREACHED\"/></status>",

        "collectionInterval": "Global Default",

    "upTime": "11:31:23.86",

    "roleSource": "AUTO",

    "instanceUuid": "ac011454-73ac-43fa-baa5-b84f6d6d3600",

    "id": "ac011454-73ac-43fa-baa5-b84f6d6d3600"

},

{

    "location": null,

    "type": "Cisco GatewayServer",

    "errorCode": "DEV-UNREACHED",

    "serialNumber": null,

    "family": "Routers",

    "errorDescription": "SNMP timeouts are occurring with this device. Either the SNMP credentials are not correctly provided to controller or the device is responding slow and snmp timeout is low. If its a timeout issue, controller will attempt to progressively adjust the timeout in subsequent collection cycles to get device to managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

    "softwareVersion": "15.7(3)M2",

    "macAddress": "aa:bb:cc:00:52:00",

    "series": "Other Routers",

    "lastUpdateTime": 1655266955135,

    "locationName": null,

    "tagCount": "0",

    "hostname": "Rdemo5-vnpro.vnpro.vn",

    "role": "DISTRIBUTION",

    "apManagerInterfaceIp": "",

    "bootDateTime": "2022-03-16 07:22:40",

    "collectionStatus": "Partial Collection Failure",

        "interfaceCount": "4",

        "lineCardCount": null,

        "lineCardId": null,

        "managementIpAddress": "10.215.26.237",

        "memorySize": "883975308",

        "platformId": null,

        "reachabilityFailureReason": "SNMP Connectivity Failed",

        "reachabilityStatus": "Unreachable",

        "snmpContact": "",

        "snmpLocation": "",

        "tunnelUdpPort": null,

        "lastUpdated": "2022-06-15 04:22:35",

        "inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

        "collectionInterval": "Global Default",

        "upTime": "11:22:58.33",

        "roleSource": "AUTO",

        "instanceUuid": "07dea39f-80df-4878-afe5-cab6f97d1a12",

        "id": "07dea39f-80df-4878-afe5-cab6f97d1a12"

    },

    {

        "location": null,

        "type": "Cisco GatewayServer",

        "errorCode": "DEV-UNREACHED",

        "serialNumber": null,

        "family": "Routers",

        "errorDescription": "SNMP timeouts are occurring with this device. Either the

SNMP credentials are not correctly provided to controller or the device is responding

slow and snmp timeout is low. If its a timeout issue, controller will attempt to progressively adjust the timeout in subsequent collection cycles to get device to managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

        "softwareVersion": "15.7(3)M2",

        "macAddress": "aa:bb:cc:00:20:00",

        "series": "Other Routers",

        "lastUpdateTime": 1655265681091,

        "locationName": null,

        "tagCount": "0",

        "hostname": "RouterHan.vnpro.vn",

        "role": "CORE",

        "apManagerInterfaceIp": "",

        "bootDateTime": "2022-03-03 07:28:41",

        "collectionStatus": "Partial Collection Failure",

        "interfaceCount": "4",

        "lineCardCount": null,

        "lineCardId": null,

        "managementIpAddress": "10.215.26.254",

        "memorySize": "883975308",

        "platformId": null,

        "reachabilityFailureReason": "SNMP Connectivity Failed",

        "reachabilityStatus": "Unreachable",

        "snmpContact": "",

        "snmpLocation": "",

        "tunnelUdpPort": null,

        "lastUpdated": "2022-06-15 04:01:21",

        "inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

        "collectionInterval": "Global Default",

        "upTime": "20:24:41.10",

        "roleSource": "AUTO",

        "instanceUuid": "3d6f503e-a4b2-4ee2-a58a-a2ab3bdb5711",

        "id": "3d6f503e-a4b2-4ee2-a58a-a2ab3bdb5711"

    },

    {

        "location": null,

        "type": "Cisco GatewayServer",

        "errorCode": "DEV-UNREACHED",

        "serialNumber": null,

        "family": "Routers",

        "errorDescription": "SNMP timeouts are occurring with this device. Either the

SNMP credentials are not correctly provided to controller or the device is responding

slow and snmp timeout is low. If its a timeout issue, controller will attempt to

progressively adjust the timeout in subsequent collection cycles to get device to

managed state. User can also run discovery again only for this device using the range

discovery feature after adjusting the timeout and snmp credentials as required.",

        "softwareVersion": "15.7(3)M2",

        "macAddress": "aa:bb:cc:00:80:00",

        "series": "Other Routers",

        "lastUpdateTime": 1655266077173,

        "locationName": null,

        "tagCount": "0",

        "hostname": "RouterLoi.vnpro.vn",

        "role": "CORE",

"apManagerInterfaceIp": "",

"bootDateTime": "2022-03-23 02:54:36",

"collectionStatus": "Partial Collection Failure",

"interfaceCount": "4",

"lineCardCount": null,

"lineCardId": null,

"managementIpAddress": "10.215.27.154",

"memorySize": "883975308",

"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

"reachabilityStatus": "Unreachable",

"snmpContact": "",

"snmpLocation": "",

"tunnelUdpPort": null,

"lastUpdated": "2022-06-15 04:07:57",

"inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

"collectionInterval": "Global Default",

"upTime": "20:23:05.75",

"roleSource": "AUTO",

"instanceUuid": "33df7956-b70b-48cb-9aab-6756187e7673",

"id": "33df7956-b70b-48cb-9aab-6756187e7673"

},

{

"location": null,

"type": "Cisco GatewayServer",

"errorCode": "DEV-UNREACHED",

"serialNumber": null,

"family": "Routers",

"errorDescription": "SNMP timeouts are occurring with this device. Either the SNMP credentials are not correctly provided to controller or the device is responding slow and snmp timeout is low. If its a timeout issue, controller will attempt to progressively adjust the timeout in subsequent collection cycles to get device to managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

"softwareVersion": "15.7(3)M2",

"macAddress": "aa:bb:cc:00:50:00",

"series": "Other Routers",

"lastUpdateTime": 1655266521962,

"locationName": null,

"tagCount": "0",

"hostname": "RouterQuy.vnpro.vn",

"role": "CORE",

"apManagerInterfaceIp": "",

"bootDateTime": "2022-03-23 02:54:36",

"collectionStatus": "Partial Collection Failure",

"interfaceCount": "4",

"lineCardCount": null,

"lineCardId": null,

"managementIpAddress": "10.215.27.151",

"memorySize": "883975308",

"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

"reachabilityStatus": "Unreachable",

"snmpContact": "",

"snmpLocation": "",

     "tunnelUdpPort": null,

     "lastUpdated": "2022-06-15 04:15:21",

     "inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

     "collectionInterval": "Global Default",

     "upTime": "20:23:05.30",

     "roleSource": "AUTO",

     "instanceUuid": "dd7b01b1-e1a5-4156-a75f-d919217078d7",

     "id": "dd7b01b1-e1a5-4156-a75f-d919217078d7"

   },

   {

     "location": null,

     "type": "Cisco Catalyst 3560X-48T Switch",

     "errorCode": "DEV-UNREACHED",

     "serialNumber": null,

     "family": "Switches and Hubs",

     "errorDescription": "SNMP timeouts are occurring with this device. Either the SNMP credentials are not correctly provided to controller or the device is responding slow and snmp timeout is low. If its a timeout issue, controller will attempt to progressively adjust the timeout in subsequent collection cycles to get device to managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

     "softwareVersion": "15.2(CML_NIGHTLY_20151103)FLO_DSGS7",

     "macAddress": "aa:bb:cc:00:10:00",

     "series": "Cisco Catalyst 3560-X Series Switches",

     "lastUpdateTime": 1655266541114,

     "locationName": null,

     "tagCount": "0",

        "hostname": "SW1-VNPRO-0303.vnpro.vn",

        "role": "ACCESS",

        "apManagerInterfaceIp": "",

        "bootDateTime": "2022-03-03 07:20:32",

        "collectionStatus": "Partial Collection Failure",

        "interfaceCount": "7",

        "lineCardCount": null,

        "lineCardId": null,

        "managementIpAddress": "10.215.26.249",

        "memorySize": "NA",

        "platformId": null,

        "reachabilityFailureReason": "SNMP Connectivity Failed",

        "reachabilityStatus": "Unreachable",

        "snmpContact": "",

        "snmpLocation": "",

        "tunnelUdpPort": null,

        "lastUpdated": "2022-06-15 04:15:41",

        "inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

        "collectionInterval": "Global Default",

        "upTime": "23:04:59.78",

        "roleSource": "AUTO",

        "instanceUuid": "92e88d06-ecc5-4a93-9d55-218791075938",

        "id": "92e88d06-ecc5-4a93-9d55-218791075938"

    },

    {

        "location": null,

        "type": "Cisco Catalyst 3560X-48T Switch",

"errorCode": "DEV-UNREACHED",

"serialNumber": null,

"family": "Switches and Hubs",

"errorDescription": "SNMP timeouts are occurring with this device. Either the SNMP credentials are not correctly provided to controller or the device is responding slow and snmp timeout is low. If its a timeout issue, controller will attempt to progressively adjust the timeout in subsequent collection cycles to get device to managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

"softwareVersion": "15.2(CML_NIGHTLY_20190423)FLO_DSGS7",

"macAddress": "aa:bb:cc:00:5b:00",

"series": "Cisco Catalyst 3560-X Series Switches",

"lastUpdateTime": 1655265752870,

"locationName": null,

"tagCount": "0",

"hostname": "SW1.tdtu.vn",

"role": "ACCESS",

"apManagerInterfaceIp": "",

"bootDateTime": "2022-04-21 14:15:44",

"collectionStatus": "Partial Collection Failure",

"interfaceCount": "4",

"lineCardCount": null,

"lineCardId": null,

"managementIpAddress": "10.215.26.205",

"memorySize": "NA",

"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

"reachabilityStatus": "Unreachable",

        "snmpContact": "",

        "snmpLocation": "",

        "tunnelUdpPort": null,

        "lastUpdated": "2022-06-15 04:02:32",

        "inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

        "collectionInterval": "Global Default",

        "upTime": "1 day, 1:52:52.72",

        "roleSource": "AUTO",

        "instanceUuid": "d58a3547-f8a7-44ec-a2f3-af1e1b95ccb2",

        "id": "d58a3547-f8a7-44ec-a2f3-af1e1b95ccb2"

    },

    {

        "location": null,

        "type": "Cisco GatewayServer",

        "errorCode": "DEV-UNREACHED",

        "serialNumber": null,

        "family": "Routers",

        "errorDescription": "SNMP timeouts are occurring with this device. Either the

SNMP credentials are not correctly provided to controller or the device is responding

slow and snmp timeout is low. If its a timeout issue, controller will attempt to

progressively adjust the timeout in subsequent collection cycles to get device to

managed state. User can also run discovery again only for this device using the range

discovery feature after adjusting the timeout and snmp credentials as required.",

        "softwareVersion": "15.7(3)M2",

        "macAddress": "aa:bb:cc:00:90:00",

        "series": "Other Routers",

        "lastUpdateTime": 1655266627117,

        "locationName": null,

        "tagCount": "0",

        "hostname": "vnpro.vnpro.vn",

        "role": "CORE",

        "apManagerInterfaceIp": "",

        "bootDateTime": "2022-03-23 02:54:35",

        "collectionStatus": "Partial Collection Failure",

        "interfaceCount": "4",

        "lineCardCount": null,

        "lineCardId": null,

        "managementIpAddress": "10.215.27.155",

        "memorySize": "883975308",

        "platformId": null,

        "reachabilityFailureReason": "SNMP Connectivity Failed",

        "reachabilityStatus": "Unreachable",

        "snmpContact": "",

        "snmpLocation": "",

        "tunnelUdpPort": null,

        "lastUpdated": "2022-06-15 04:17:07",

        "inventoryStatusDetail": "<status><general
code=\"DEV_UNREACHED\"/></status>",

        "collectionInterval": "Global Default",

        "upTime": "20:23:06.64",

        "roleSource": "AUTO",

        "instanceUuid": "c9196151-88f9-4277-9580-b861721d8d1b",

        "id": "c9196151-88f9-4277-9580-b861721d8d1b"

    },

    {

"location": null,

"type": null,

"errorCode": "DEV-UNREACHED",

"serialNumber": null,

"family": null,

"errorDescription": "SNMP timeouts are occurring with this device. Either the SNMP credentials are not correctly provided to controller or the device is responding slow and snmp timeout is low. If its a timeout issue, controller will attempt to progressively adjust the timeout in subsequent collection cycles to get device to managed state. User can also run discovery again only for this device using the range discovery feature after adjusting the timeout and snmp credentials as required.",

"softwareVersion": null,

"macAddress": null,

"series": null,

"lastUpdateTime": 1655267006799,

"locationName": null,

"tagCount": "0",

"hostname": null,

"role": "CORE",

"apManagerInterfaceIp": "",

"bootDateTime": null,

"collectionStatus": "Could Not Synchronize",

"interfaceCount": null,

"lineCardCount": null,

"lineCardId": null,

"managementIpAddress": "10.215.26.204",

"memorySize": "NA",

"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

"reachabilityStatus": "Unreachable",

"snmpContact": null,

"snmpLocation": null,

"tunnelUdpPort": null,

"lastUpdated": "2022-06-15 04:23:26",

"inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

"collectionInterval": "Global Default",

"upTime": null,

"roleSource": "AUTO",

"instanceUuid": "f0fef4a8-1542-407a-9012-3c72314d1927",

"id": "f0fef4a8-1542-407a-9012-3c72314d1927"

},

{

"location": null,

"type": null,

"errorCode": "DEV-UNREACHED",

"serialNumber": null,

"family": null,

"errorDescription": "SNMP timeouts are occurring with this device. Either the
SNMP credentials are not correctly provided to controller or the device is responding
slow and snmp timeout is low. If its a timeout issue, controller will attempt to
progressively adjust the timeout in subsequent collection cycles to get device to
managed state. User can also run discovery again only for this device using the range
discovery feature after adjusting the timeout and snmp credentials as required.",

"softwareVersion": null,

"macAddress": null,

"series": null,

"lastUpdateTime": 1655265912983,

"locationName": null,

"tagCount": "0",

"hostname": null,

"role": "CORE",

"apManagerInterfaceIp": "",

"bootDateTime": null,

"collectionStatus": "Could Not Synchronize",

"interfaceCount": null,

"lineCardCount": null,

"lineCardId": null,

"managementIpAddress": "10.215.26.122",

"memorySize": "NA",

"platformId": null,

"reachabilityFailureReason": "SNMP Connectivity Failed",

"reachabilityStatus": "Unreachable",

"snmpContact": null,

"snmpLocation": null,

"tunnelUdpPort": null,

"lastUpdated": "2022-06-15 04:05:12",

"inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

"collectionInterval": "Global Default",

"upTime": null,

"roleSource": "AUTO",

"instanceUuid": "a098a954-2513-4609-a0bf-d3bc03470eb8",

"id": "a098a954-2513-4609-a0bf-d3bc03470eb8"

```
    },
    {
        "location": null,
        "type": null,
        "errorCode": "DEV-UNREACHED",
        "serialNumber": null,
        "family": null,
        "errorDescription": "SNMP timeouts are occurring with this device. Either the
SNMP credentials are not correctly provided to controller or the device is responding
slow and snmp timeout is low. If its a timeout issue, controller will attempt to
progressively adjust the timeout in subsequent collection cycles to get device to
managed state. User can also run discovery again only for this device using the range
discovery feature after adjusting the timeout and snmp credentials as required.",
        "softwareVersion": null,
        "macAddress": null,
        "series": null,
        "lastUpdateTime": 1655265723780,
        "locationName": null,
        "tagCount": "0",
        "hostname": null,
        "role": "CORE",
        "apManagerInterfaceIp": "",
        "bootDateTime": null,
        "collectionStatus": "Could Not Synchronize",
        "interfaceCount": null,
        "lineCardCount": null,
        "lineCardId": null,
        "managementIpAddress": "10.215.26.247",
```

          "memorySize": "NA",

          "platformId": null,

          "reachabilityFailureReason": "SNMP Connectivity Failed",

          "reachabilityStatus": "Unreachable",

          "snmpContact": null,

          "snmpLocation": null,

          "tunnelUdpPort": null,

          "lastUpdated": "2022-06-15 04:02:03",

          "inventoryStatusDetail": "<status><general

code=\"DEV_UNREACHED\"/></status>",

          "collectionInterval": "Global Default",

          "upTime": null,

          "roleSource": "AUTO",

          "instanceUuid": "1d1cc969-a77c-4edf-8e49-be8b744e15df",

          "id": "1d1cc969-a77c-4edf-8e49-be8b744e15df"

      }

    ],

    "version": "1.0"

}

Giải thích code:

```
header = {
        "x-auth-token": get_ticket()
    }
    #Lấy danh sách thiết bị
    responses_device = requests.get(url1, headers = header,
verify = False)
```

- Ở hàm lấy danh sách thiết bị chúng ta quan tâm header ta sẽ truyền vào giá trị

  ticket mà mình đã yêu cầu bên trên.

- Sau đó là sử dụng hàm **get()** để yêu cầu lấy thông tin của những thiết bị có trong APIC-EM.