

Chapter 1: A Primer on Python 3

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Chapter 2: Connecting to Network Devices via SSH Using Paramiko

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Chapter 3: Building Configuration Templates Using Jinja2

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Chapter 5: Model-Driven Programmability with NETCONF and ncclient

```
ch05 git:(master) * python3 connect.py
http://openconfig.net/yang/aaa?module=openconfig-aaa&revision=2017-09-18
http://openconfig.net/yang/aaa/types?module=openconfig-aaa-types&revision=2017-09-18
http://openconfig.net/yang/acl?module=openconfig-acl&revision=2017-05-26&deviations=cisco-xe-openconfig-acl-deviation
http://openconfig.net/yang/alarms?module=openconfig-alarms&revision=2017-08-24
http://openconfig.net/yang/bgp?module=openconfig-bgp&revision=2016-06-21
http://openconfig.net/yang/bgp-policy?module=openconfig-bgp-policy&revision=2016-06-21&deviations=cisco-xe-openconfig-bgp-policy-deviation
http://openconfig.net/yang/bgp-types?module=openconfig-bgp-types&revision=2016-06-21
http://openconfig.net/yang/cisco-xe-openconfig-if-ethernet-deviation?module=cisco-xe-openconfig-if-ethernet-deviation&revision=2017-11-01
http://openconfig.net/yang/cisco-xe-openconfig-if-ip-deviation?module=cisco-xe-openconfig-if-ip-deviation&revision=2017-03-04
http://openconfig.net/yang/cisco-xe-openconfig-interfaces-deviation?module=cisco-xe-openconfig-interfaces-deviation&revision=2018-03-27
http://openconfig.net/yang/cisco-xe-openconfig-system-deviation?module=cisco-xe-openconfig-system-deviation&revision=2017-11-27
http://openconfig.net/yang/header-fields?module=openconfig-packet-match&revision=2017-05-26
http://openconfig.net/yang/interfaces?module=openconfig-interfaces&revision=2018-01-05&deviations=cisco-xe-openconfig-interfaces-deviation
http://openconfig.net/yang/interfaces/aggregate?module=openconfig-if-aggregate&revision=2018-01-05
http://openconfig.net/yang/interfaces/ethernet?module=openconfig-if-ethernet&revision=2018-01-05&deviations=cisco-xe-openconfig-if-ethernet-deviation
http://openconfig.net/yang/interfaces/ip?module=openconfig-if-ip&revision=2018-01-05&deviations=cisco-xe-openconfig-if-ip-deviation,cisco-xe-openconfig-interfaces-deviation
http://openconfig.net/yang/interfaces/ip-ext?module=openconfig-if-ip-ext&revision=2018-01-05
http://openconfig.net/yang/local-routing?module=openconfig-local-routing&revision=2016-05-11
http://openconfig.net/yang/network-instance?module=openconfig-network-instance&revision=2017-01-13&deviations=cisco-xe-openconfig-bgp-deviation,cisco-xe-openconfig-network-instance-deviation
http://openconfig.net/yang/network-instance-l3?module=openconfig-network-instance-l3&revision=2017-01-13
http://openconfig.net/yang/network-instance-types?module=openconfig-network-instance-types&revision=2016-12-15
http://openconfig.net/yang/openconfig-ext?module=openconfig-extensions&revision=2017-04-11
http://openconfig.net/yang/openconfig-types?module=openconfig-types&revision=2018-01-16
http://openconfig.net/yang/packet-match-types?module=openconfig-packet-match-types&revision=2017-05-26
http://openconfig.net/yang/platform?module=openconfig-platform&revision=2016-12-22
http://openconfig.net/yang/platform-types?module=openconfig-platform-types&revision=2017-08-16
http://openconfig.net/yang/platform/port?module=openconfig-platform-port&revision=2016-10-24
http://openconfig.net/yang/platform/transceiver?module=openconfig-platform-transceiver&revision=2017-09-18
http://openconfig.net/yang/policy-types?module=openconfig-policy-types&revision=2016-05-12
http://openconfig.net/yang/rib/bgp?module=openconfig-rib-bgp&revision=2017-03-07
http://openconfig.net/yang/rib/bgp-ext?module=openconfig-rib-bgp-ext&revision=2016-04-11
http://openconfig.net/yang/rib/bgp-types?module=openconfig-rib-bgp-types&revision=2016-04-11
http://openconfig.net/yang/routing-policy?module=openconfig-routing-policy&revision=2016-05-12&deviations=cisco-xe-openconfig-routing-policy-deviation
http://openconfig.net/yang/system?module=openconfig-system&revision=2018-01-21&deviations=cisco-xe-openconfig-system-deviation
http://openconfig.net/yang/system/logging?module=openconfig-system-logging&revision=2017-09-18
```

```
ch05 git:(master) * python3 get_config.py
<?xml version="1.0" encoding="UTF-8"?><data>
  <xmlns:urn:ietf:params:xml:ns:netconf:base:1.0>
  <xmlns:nc="urn:ietf:params:xml:ns:netconf:base:1.0"><native>
  <xmlns="http://cisco.com/ns/yang/Cisco-IOS-XE-native"><version>16.9</version><boot-start-marker/><boot-end-marker/><banner><motd><banner>^CfDs
hajfjll\N^</banner></motd></banner><service><timestamps><debug><datetime><msec/></datetime></debug><log><datetime><msec/></datetime></log></ti
mestamps></service><platform><console>
  <xmlns="http://cisco.com/ns/yang/Cisco-IOS-XE-platform"><output-virtual/><output/><console/><platform><hostname>csr1000v</hostname><enable><sec
ret><type>5</type><secret>$1$gkjl1$EofN9ajW9k18SoRTgkYr/</secret></enable><username><name>cisco</name><privilege>15</privilege><secret
><encryption>5</encryption><secret>$1$a01Y$0AFVz000N.hE4WkY.BeYq.</secret></secret><username><name>developer</name><privilege>15</pr
ivilege><secret><encryption>5</encryption><secret>$1$HLC37K3hGBoDnShZdEr/21x.</secret></secret><username><name>root</name><privil
ege>15</privilege><secret><encryption>5</encryption><secret>$1$VpY73m9d6Qu13ko5uITB18g9D/</secret></secret><username><name>test</na
me><secret><encryption>5</encryption><secret>$1$AAqS$ajKu080oxaiXPHUfGfF0/</secret></secret><username><ip><domain><name>abc</name></domai
n><forward-protocol><protocol-nd/><protocol></forward-protocol><route><ip-route-interface-forwarding-list><prefix>0.0.0.0</prefix><mask>0.0.0.0<
/mask><fwd-list><fwd>GigabitEthernet1</fwd><interface-next-hop><ip-address>10.10.20.254</ip-address></interface-next-hop></fwd-list></ip-route-
interface-forwarding-list></route><scp><server><enable/></server></scp><ssh><rsa><keypair-name><ssh-key/><keypair-name></rsa><version>2</version>
</ssh><access-list><standard>
  <xmlns="http://cisco.com/ns/yang/Cisco-IOS-XE-acl"><name>snmp-acl</name><access-list-seq-rule><sequence>10</sequence><permit><std-ace><ipv4-pr
efix>172.25.18.0</ipv4-prefix><mask>0.0.0.255</mask></std-ace></permit></access-list-seq-rule><access-list-seq-rule><sequence>20</sequence><per
mit><std-ace><ipv4-prefix>10.22.96.0</ipv4-prefix><mask>0.0.1.255</mask></std-ace></permit></access-list-seq-rule><access-list-seq-rule><sequen
ce>30</sequence><permit><std-ace><ipv4-prefix>10.22.98.0</ipv4-prefix><mask>0.0.1.255</mask></std-ace></permit></access-list-seq-rule><access-l
ist-seq-rule><sequence>40</sequence><permit><std-ace><ipv4-prefix>10.6.96.0</ipv4-prefix><mask>0.0.1.255</mask></std-ace></permit></access-list-
seq-rule><access-list-seq-rule><sequence>50</sequence><permit><std-ace><ipv4-prefix>10.6.98.0</ipv4-prefix><mask>0.0.1.255</mask></std-ace></p
ermit></access-list-seq-rule><access-list-seq-rule><sequence>60</sequence><permit><std-ace><ipv4-prefix>10.22.245.0</ipv4-prefix><mask>0.0.0.25
5</mask></std-ace></permit></access-list-seq-rule><access-list-seq-rule><sequence>70</sequence><permit><std-ace><ipv4-prefix>172.9.32.0</ipv4-p
refix><mask>0.0.3.255</mask></std-ace></permit></access-list-seq-rule><access-list-seq-rule><sequence>80</sequence><permit><std-ace><ipv4-prefi
x>10.2.0.20</ipv4-prefix></std-ace></permit></access-list-seq-rule></standard></access-list><http>
  <xmlns="http://cisco.com/ns/yang/Cisco-IOS-XE-http"><authentication><local/></authentication><server>true</server><secure-server>true</secure-
server></http></ip><interface><GigabitEthernet><name>1</name><description>MANAGEMENT
  "INTERFACE - DON'T TOUCH"
  "ME</description><ip><address><address>10.10.20.48</address><mask>255.255.255.0</mask></primary></address></ip><mp><enabled>false</e
nabled><sysid>false</sysid></mop><negotiation>
  <xmlns="http://cisco.com/ns/yang/Cisco-IOS-XE-ethernet"><auto>true</auto></negotiation></GigabitEthernet><GigabitEthernet><name>2</name><descr
iption>Configured
  "by
  "NETCONF</description><ip><address><secondary><address>10.255.255.133</address><mask>255.255.255.0</mask></secondary></secondary><primary><add
ress>192.168.1.1</address><mask>255.255.255.0</mask></primary></address></ip><mp><enabled>false</enabled><sysid>false</sysid></mop><negotiatio
n>
  <xmlns="http://cisco.com/ns/yang/Cisco-IOS-XE-ethernet"><auto>true</auto></negotiation></GigabitEthernet><GigabitEthernet><name>3</name><descr
iption>Updated
```

```
ch05 git:(master) z python3 get_interface.py
<?xml version="1.0" encoding="UTF-8"?><data '
  xmlns:urn:ietf:params:xml:ns:netconf:base:1.0 '
  xmlns:nc="urn:ietf:params:xml:ns:netconf:base:1.0"><interfaces '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-interfaces"><interface-<name>GigabitEthernet1</name><description>MANAGEMENT '
  "INTERFACE - DON'T TOUCH ME</description><type '
  xmlns:ianaift="urn:ietf:params:xml:ns:yang:iana-if-type">ianaift:ethernetCsmacd</type><enabled>true</enabled><ipv4 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"><address-<ip>10.10.20.48</ip><netmask>255.255.255.0</netmask></address></ipv4><ipv6 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"/></interface><interface-<name>GigabitEthernet2</name><description>Network '
  'Interface</description><type '
  xmlns:ianaift="urn:ietf:params:xml:ns:yang:iana-if-type">ianaift:ethernetCsmacd</type><enabled>true</enabled><ipv4 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"><address-<ip>10.10.4</ip><netmask>255.255.255.0</netmask></address></ipv4><ipv6 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"/></interface><interface-<name>GigabitEthernet3</name><description>Network '
  'Interface</description><type '
  xmlns:ianaift="urn:ietf:params:xml:ns:yang:iana-if-type">ianaift:ethernetCsmacd</type><enabled>false</enabled><ipv4 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"/><ipv6 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"/></interface><interface-<name>Loopback2</name><description>WHATEVER '
  ?</description><type '
  xmlns:ianaift="urn:ietf:params:xml:ns:yang:iana-if-type">ianaift:softwareLoopback</type><enabled>true</enabled><ipv4 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"><address-<ip>2.2.2</ip><netmask>255.255.255.0</netmask></address></ipv4><ipv6 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"/></interface><interface-<name>Loopback99</name><description>WHATEVER99-digenaldo</description><type '
  xmlns:ianaift="urn:ietf:params:xml:ns:yang:iana-if-type">ianaift:softwareLoopback</type><enabled>true</enabled><ipv4 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"><address-<ip>99.99.99.99</ip><netmask>255.255.255.0</netmask></address></ipv4><ipv6 '
  xmlns="urn:ietf:params:xml:ns:yang:ietf-ip"/></interface></interfaces></data>')

```

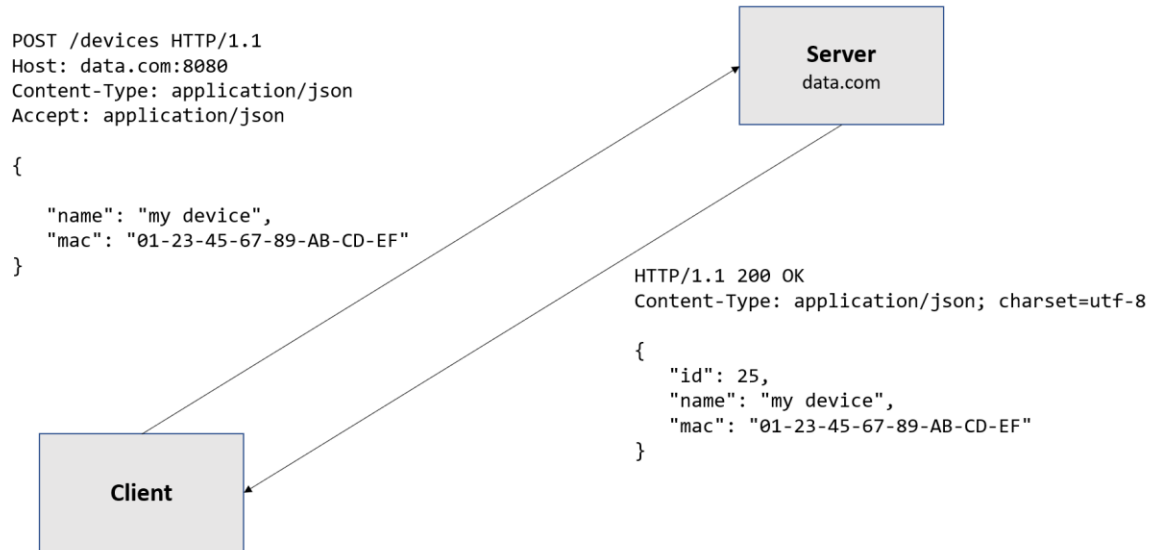
Chapter 6: Automating Complex Multi-Vendor Networks with NAPALM

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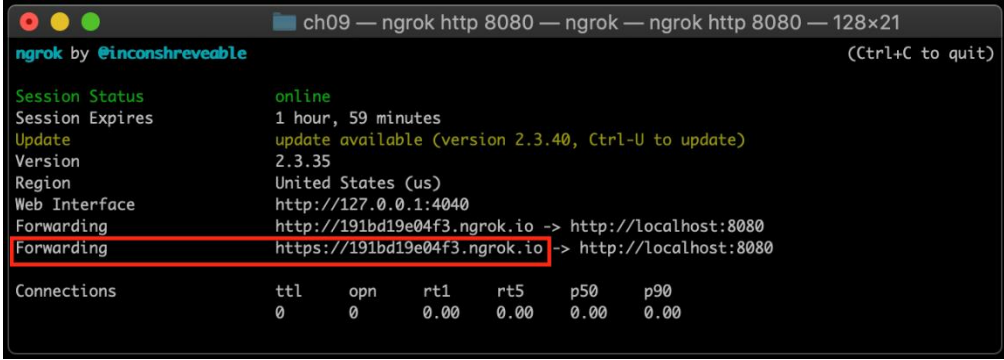
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Chapter 8: Configuring Devices Using RESTCONF and requests



Chapter 9: Consuming Controllers and High-Level Networking APIs with requests



```
ch09 — ngrok http 8080 — ngrok — ngrok http 8080 — 128x21
ngrok by @inconshreveable (Ctrl+C to quit)

Session Status      online
Session Expires    1 hour, 59 minutes
Update              update available (version 2.3.40, Ctrl-U to update)
Version             2.3.35
Region              United States (us)
Web Interface       http://127.0.0.1:4040
Forwarding          http://191bd19e04f3.ngrok.io -> http://localhost:8080
Forwarding          https://191bd19e04f3.ngrok.io -> http://localhost:8080

Connections        ttl   opn   rt1   rt5   p50   p90
                   0     0     0.00 0.00  0.00  0.00
```

Chapter 10: Incorporating your Python Scripts into an Existing Workflow by Writing Custom Ansible Modules

```
ch10 — marcel@Marcel's-MacBook-Pro — .Cookbook/ch10 — zsh — 130x34
→ ch10 git:(main) x ansible localhost -m first_module
WARNING: Executing a script that is loading libcrypto in an unsafe way. This will fail in a future version of macOS. Set the LIBRE
SSL_REDIRECT_STUB_ABORT=1 in the environment to force this into an error.
[WARNING]: Unable to parse /etc/ansible/hosts as an inventory source
[WARNING]: No inventory was parsed, only implicit localhost is available
[WARNING]: provided hosts list is empty, only localhost is available. Note that the implicit localhost does not match 'all'
localhost | SUCCESS => {
  "changed": false,
  "message": "Hello from my first ansible module"
}
```

```
ch10 — marcel@Marcel's-MacBook-Pro — .Cookbook/ch10 — zsh — 130x34
→ ch10 git:(main) x ansible-doc first_module
WARNING: Executing a script that is loading libcrypto in an unsafe way. This will fail in a future version of macOS. Set the LIBRE
SSL_REDIRECT_STUB_ABORT=1 in the environment to force this into an error.
ERROR! module first_module missing documentation (or could not parse documentation): 'NoneType' object has no attribute 'get'
→ ch10 git:(main) x
```

```
ch10 — ansible-doc documented_module — ansible-doc — less - ansible-doc documented_module — 130x34
> DOCUMENTED_MODULE (/Users/marcel/Dropbox/network_automation_cookbook/Python-Networking-Cookbook/ch10/documented_module.py)
This is a longer description of our documented module.
AUTHOR: Name (E-Mail or GitHub handle) description: A small welcome message returned by our module
type: str
EXAMPLES:
- name: Testing my documented task
  documented_module
RETURN VALUES:
  changed: bool
  message: 'Hello from my first ansible module'
message:
  description: A small welcome message returned by our module
  type: str
  returned: always
  sample: 'Hello from my first ansible module'
```

```

ch10 git:(main) x ansible localhost -m value_module -a "ip_address=10.10.10.0 netmask=28"
WARNING: Executing a script that is loading libcrypto in an unsafe way. This will fail in a future version of macOS. Set the LIBRE
SSL_REDIRECT_STUB_ABORT=1 in the environment to force this into an error.
[WARNING]: Unable to parse /etc/ansible/hosts as an inventory source
[WARNING]: No inventory was parsed, only implicit localhost is available
[WARNING]: provided hosts list is empty, only localhost is available. Note that the implicit localhost does not match 'all'
localhost | SUCCESS => {
  "addresses": [
    "10.10.10.0",
    "10.10.10.1",
    "10.10.10.2",
    "10.10.10.3",
    "10.10.10.4",
    "10.10.10.5",
    "10.10.10.6",
    "10.10.10.7",
    "10.10.10.8",
    "10.10.10.9",
    "10.10.10.10",
    "10.10.10.11",
    "10.10.10.12",
    "10.10.10.13",
    "10.10.10.14",
    "10.10.10.15"
  ],
  "changed": false
}

```

```

{
  "id": "573083052582914233",
  "name": "Test_org",
  "url": "https://n18.meraki.com/o/TY6awbs/manage/organization/overview"
},
{
  "id": "549236",
  "name": "DevNet Sandbox",
  "url": "https://n149.meraki.com/o/-t35Mb/manage/organization/overview"
},
{
  "id": "52636",
  "name": "Forest City - Other",
  "url": "https://n42.meraki.com/o/E_utnd/manage/organization/overview"
},
{
  "id": "463308",
  "name": "DevNet San Jose",
  "url": "https://n18.meraki.com/o/vB2D8a/manage/organization/overview"
},
{
  "id": "566327653141842188",
  "name": "DevNetAssoc",
  "url": "https://n6.meraki.com/o/dcGsWag/manage/organization/overview"
},
{
  "id": "681155",
  "name": "DeLab",
  "url": "https://n392.meraki.com/o/49Gm_c/manage/organization/overview"
}
],
"status": 200
}

```

```

ch10 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch10 — zsh — 130x34
}
ok: [localhost] => (item={u'url': u'https://n22.meraki.com/o/LLZoItdw/manage/organization/overview', u'id': u'575334852396583243',
u'name': u'Test'}) => {
  "msg": "Test"
}
ok: [localhost] => (item={u'url': u'https://n18.meraki.com/o/TY6awbs/manage/organization/overview', u'id': u'573083052582914233',
u'name': u'Test_org'}) => {
  "msg": "Test_org"
}
ok: [localhost] => (item={u'url': u'https://n149.meraki.com/o/-t35Mb/manage/organization/overview', u'id': u'549236', u'name': u'D
evNet Sandbox'}) => {
  "msg": "DevNet Sandbox"
}
ok: [localhost] => (item={u'url': u'https://n42.meraki.com/o/E_utnd/manage/organization/overview', u'id': u'52636', u'name': u'For
est City - Other'}) => {
  "msg": "Forest City - Other"
}
ok: [localhost] => (item={u'url': u'https://n18.meraki.com/o/vB2D8a/manage/organization/overview', u'id': u'463308', u'name': u'De
vNet San Jose'}) => {
  "msg": "DevNet San Jose"
}
ok: [localhost] => (item={u'url': u'https://n6.meraki.com/o/dcGsWag/manage/organization/overview', u'id': u'566327653141842188', u
'name': u'DevNetAssoc'}) => {
  "msg": "DevNetAssoc"
}
ok: [localhost] => (item={u'url': u'https://n392.meraki.com/o/49Gm_c/manage/organization/overview', u'id': u'681155', u'name': u'D
eLab'}) => {
  "msg": "DeLab"
}
PLAY RECAP *****
localhost:LINE : ok=3   changed=0   unreachable=0   failed=0

```

```

< PLAY RECAP >
-----
  \  ^__^
   (oo)\_____)
    (__)\       )\/\
       ||----w |
       ||     ||

localhost:LINE : ok=3

```

the module previously we now have to pass it from our playbook. We then register the output of our module to be saved in the result variable.

With our module called we can then print out the output. We use the debug task that comes with ansible together with the built-in with-items directive to iterate over all items in our list of networks. Remember that, like the other modules, our custom module just returned JSON and ansible can thus easily parse the module output and make it available for simple looping operations. In our case we loop over all organizations and then print out the name as the debug message.

There's more

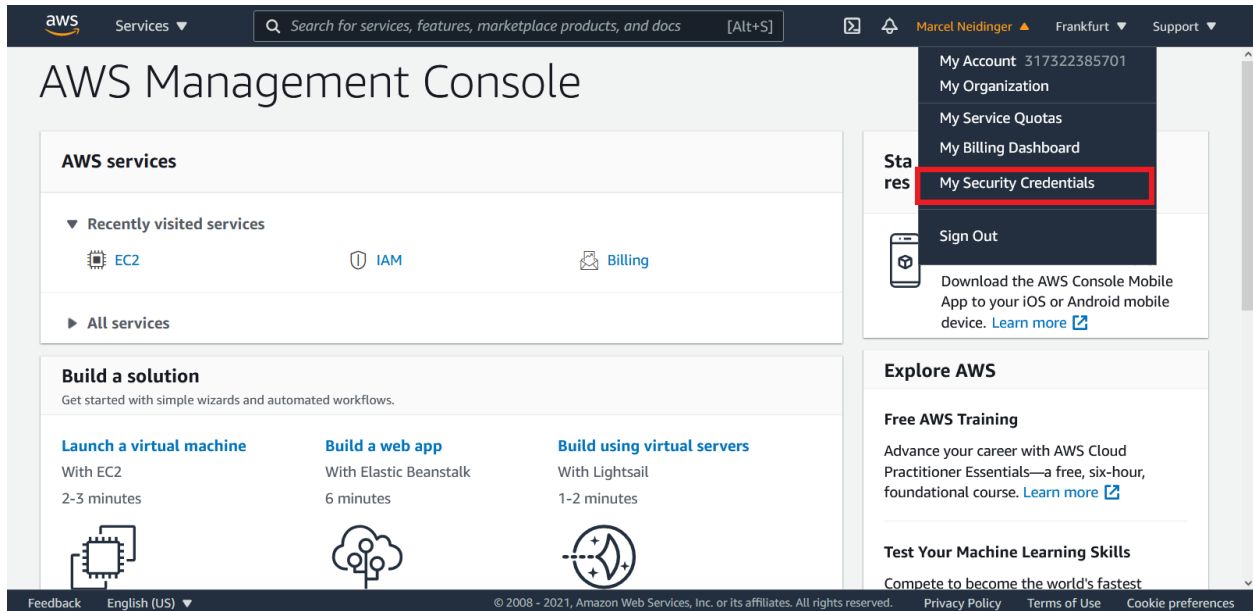
You might encounter that your ansible is displaying the name of the

```

changed=0   unreachable=0   failed=0

```

Chapter 11: Automating AWS Cloud Networking Infrastructure Using the AWS Python SDK



Your Security Credentials

Use this page to manage the credentials for your AWS account. To manage credentials for AWS Identity and Access Management (IAM) users, use the [IAM Console](#).

To learn more about the types of AWS credentials and how they're used, see [AWS Security Credentials](#) in AWS General Reference.

▲ Password

▲ Multi-factor authentication (MFA)

▼ Access keys (access key ID and secret access key)

Use access keys to make programmatic calls to AWS from the AWS CLI, Tools for PowerShell, AWS SDKs, or direct AWS API calls. You can have a maximum of two access keys (active or inactive) at a time.

For your protection, you should never share your secret keys with anyone. As a best practice, we recommend frequent key rotation.

If you lose or forget your secret key, you cannot retrieve it. Instead, create a new access key and make the old key inactive. [Learn more](#)

Created	Access Key ID	Last Used	Last Used Region	Last Used Service	Status	Actions
Jun 9th 2021	AKIAUTYPDLESYCFCS2A5C	2021-06-15 21:37 UTC+0200	eu-central-1	ec2	Active	Make Inactive Delete

[Create New Access Key](#)

Root user access keys provide unrestricted access to your entire AWS account. If you need long-term access keys, we recommend creating a new IAM user with limited permissions and generating access keys for that user instead. [Learn more](#)

▲ CloudFront key pairs

▲ X.509 certificate

▲ Account identifiers

Create Access Key

✔ Your access key (access key ID and secret access key) has been created successfully.

Download your key file now, which contains your new access key ID and secret access key. If you do not download the key file now, you will not be able to retrieve your secret access key again.

To help protect your security, store your secret access key securely and do not share it.

▼ Hide Access Key

Access Key ID: [REDACTED]

Secret Access Key: [REDACTED]

Download Key File Close

```

ch11 — marcel@Marcel's-MacBook-Pro — ../Cookbook/ch11 — zsh — 179x30
+ ch11 git:(main) x python3 get_facts.py
VPCs
VPC Id: vpc-09a3ea6059af4ec85
VPC Id: vpc-e69b818d
- t2.micro launched at 2021-06-01 20:38:01+00:00
VPC Id: vpc-047bd43283ec3cd7b
+ ch11 git:(main) x

```

Boto3 Docs 1.17.90 documentation

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 - AppConfig
 - Appflow
 - AppIntegrationsService
 - ApplicationAutoScaling
 - ApplicationInsights
 - ApplicationCostProfiler

Response Syntax

```

{
  'Vpcs': [
    {
      'CidrBlock': 'string',
      'DhcpOptionsId': 'string',
      'State': 'pending'|'available',
      'VpcId': 'string',
      'OwnerId': 'string',
      'InstanceTenancy': 'default'|'dedicated'|'host',
      'Ipv6CidrBlockAssociationSet': [
        {
          'AssociationId': 'string',
          'Ipv6CidrBlock': 'string',
          'Ipv6CidrBlockState': {
            'State': 'associating'|'associated'|'disassociating'|'disassociati
            'StatusMessage': 'string'
          },
          'NetworkBorderGroup': 'string',
          'Ipv6Pool': 'string'
        }
      ],
      'CidrBlockAssociationSet': [
        {
          'AssociationId': 'string',
          'CidrBlock': 'string',
          'CidrBlockState': {
            'State': 'associating'|'associated'|'disassociating'|'disassociati
            'StatusMessage': 'string'
          }
        }
      ],
      'IsDefault': True|False,
      'Tags': [
        {
          'Key': 'string',
          'Value': 'string'
        }
      ]
    }
  ],
  'NextToken': 'string'
}

```

```

ch11 — marcel@Marcel's-MacBook-Pro — .Cookbook/ch11 — zsh — 130x30
→ ch11 git:(main) x python3 create_ec2.py
[ec2.Instance(id='i-0f0c78bba64e219b3')]
→ ch11 git:(main) x

```

The screenshot shows the AWS Management Console interface for EC2 instances. The main content area displays a table with the following data:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP
-	i-00d038c0813d33237	Running	t2.micro	2/2 checks passed	No alarms	eu-central-1c	ec2-3-68-95-216.eu-ce...	3.68.95.216	-
-	i-0eeefdc3e970851d0	Running	t2.small	Initializing	No alarms	eu-central-1b	ec2-18-198-23-35.eu-c...	18.198.23.35	-

The screenshot shows the 'Step 1: Choose an Amazon Machine Image (AMI)' wizard in the AWS console. The 'Quick Start' section lists the following AMIs:

- Amazon Linux 2 AMI (HVM), SSD Volume Type** - ami-0bad4a5e987bdebd (64-bit x86) / ami-04b5f379bb2b7fe4f (64-bit Arm)
- Red Hat Enterprise Linux 8 (HVM), SSD Volume Type** - ami-06ec8443c2a35b0ba (64-bit x86) / ami-0b095f954d2592ad (64-bit Arm)
- SUSE Linux Enterprise Server 15 SP2 (HVM), SSD Volume Type** - ami-09e8a19c9eda495b3 (64-bit x86) / ami-002e594bc782530 (64-bit Arm)
- Ubuntu Server 20.04 LTS (HVM), EBS General Purpose (SSD) Volume Type** - ami-05f7491af5ee7f33a (64-bit x86) / ami-08f11f414f566d1a (64-bit Arm)
- Microsoft Windows Server 2019 Base** - ami-086d0be14ab5129e1


```
ch11 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch11 — -zsh — 130x30
→ ch11 git:(main) x python3 create_vpc.py
Created vpc vpc-08acf17eb83647d7c
→ ch11 git:(main) x
```

The screenshot shows the AWS Management Console interface. The main content area displays 'Your VPCs (2)' with a table listing two VPCs. The second VPC, 'vpc-08acf17eb83647d7c', is highlighted with a red border. The table has columns for Name, VPC ID, State, IPv4 CIDR, and IPv6 CIDR. The left sidebar contains navigation links for various VPC-related services.

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR
-	vpc-e69b818d	Available	172.31.0.0/16	-
-	vpc-08acf17eb83647d7c	Available	10.10.0.0/16	-

```
ch11 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch11 — -zsh — 130x30
→ ch11 git:(main) x python3 create_vpc.py
Traceback (most recent call last):
  File "create_vpc.py", line 5, in <module>
    vpc = ec2_resource.create_vpc(CidrBlock='10.10.0.1/16')
  File "/usr/local/lib/python3.8/site-packages/boto3/resources/factory.py", line 520, in do_action
    response = action(self, *args, **kwargs)
  File "/usr/local/lib/python3.8/site-packages/boto3/resources/action.py", line 83, in __call__
    response = getattr(parent.meta.client, operation_name)(*args, **params)
  File "/usr/local/lib/python3.8/site-packages/botocore/client.py", line 386, in _api_call
    return self._make_api_call(operation_name, kwargs)
  File "/usr/local/lib/python3.8/site-packages/botocore/client.py", line 705, in _make_api_call
    raise error_class(parsed_response, operation_name)
botocore.exceptions.ClientError: An error occurred (VpclimitExceeded) when calling the CreateVpc operation: The maximum number of VPCs has been reached.
→ ch11 git:(main) x
```

```
ch11 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch11 — -zsh — 130x30
→ ch11 git:(main) x python3 subnet_vpc.py
Created vpc vpc-02d1f6ca36ad43dd6
Instance with id i-04b0995e2eda14618 created
→ ch11 git:(main) x
```

Instance summary for i-04b0995e2eda14618 Info

Updated less than a minute ago

Instance ID	i-04b0995e2eda14618	Public IPv4 address	-	Private IPv4 addresses	10.10.1.125
Instance state	Running	Public IPv4 DNS	-	Private IPv4 DNS	ip-10-10-1-125.eu-central-1.compute.internal
Instance type	t2.small	Elastic IP addresses	-	VPC ID	vpc-02d1f6ca36ad43dd6
AWS Compute Optimizer finding	Opt-in to AWS Compute Optimizer for recommendations. Learn more	IAM Role	-	Subnet ID	subnet-0b23fc62b966751b7

Instance details Info

Platform	AMI ID	Monitoring
Ubuntu (Inferred)	ami-05f7491af5eef733a	disabled
Platform details	AMI name	Termination protection

```
ch11 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch11 — -zsh — 130x30
→ ch11 git:(main) x python3 create_routes.py
Created vpc vpc-0dfda2157b55eb974
Created subnet subnet-07909c2e09f321a4b
Created gateway igw-0ad677247bf57526c and associated with vpc-0dfda2157b55eb974
Created route table rtb-0124cb27565bc8c9f
Created route ec2.Route(route_table_id='rtb-0124cb27565bc8c9f', destination_cidr_block='0.0.0.0/0') for 0.0.0.0/0 block
→ ch11 git:(main) x
```

New VPC Experience
Tell us what you think

VPC Dashboard **New**

Filter by VPC:

Select a VPC

VIRTUAL PRIVATE CLOUD

Your VPCs **New**

Subnets **New**

Route Tables **New**

Internet Gateways **New**

Egress Only Internet Gateways **New**

DHCP Options Sets **New**

Elastic IPs **New**

Managed Prefix Lists **New**

Endpoints

Endpoint Services

NAT Gateways **New**

Peering Connections

SECURITY

Network ACLs **New**

Security Groups **New**

VPC > Your VPCs > vpc-0dfda2157b55eb974

vpc-0dfda2157b55eb974

Actions

Details Info


VPC ID vpc-0dfda2157b55eb974	State Available	DNS hostnames Disabled	DNS resolution Enabled
Tenancy Default	DHCP options set dopt-20a7bd4b	Main route table rtb-0834b8673a288dcc6	Main network ACL acl-0d3ec4ef5732dca0f
Default VPC No	IPv4 CIDR 10.10.0.0/16	IPv6 pool -	IPv6 CIDR -
Route 53 Resolver DNS Firewall rule groups -	Owner ID 317322385701		

CIDRs | Flow logs | Tags

IPv4 CIDRs Info

CIDR	Status
------	--------

Chapter 12: Automating your Network Security Using Python and the Firepower APIs

 [Download Spec](#) [Legacy Explorer](#) [Logout](#)

Cisco Firepower Management Center Open API Specification ^{1.0.0}

/fmc.json

Specifies the REST URLs and methods supported in the Cisco Firepower Management Center API. Refer to the version specific [REST API Quick Start Guide](#) for additional information.

[Cisco Technical Assistance Center \(TAC\) - Website](#)
[Send email to Cisco Technical Assistance Center \(TAC\)](#)
[Cisco Firepower Management Center Licensing](#)

Domains
Global

- Devices >
- Policy Assignments >
- Device HA Pairs >
- Updates >
- Intelligence >
- Audit >
- Device Groups >
- Integration >
- Status >

- Intelligence >
- Audit >
- Device Groups >
- Integration >
- Status >
- Device Clusters >
- System Information >

GET /api/fmc_platform/v1/info/serverversion

GET /api/fmc_platform/v1/info/serverversion/{objectId}

- Policy >
- Object >
- Deployment >

GET /api/fmc_platform/v1/info/serverversion

API Operation for Server Version.

Parameters

Try it out

Name	Description
offset integer <i>(query)</i>	Index of first item to return.
limit integer <i>(query)</i>	Number of items to return.
expanded boolean <i>(query)</i>	If set to true, the GET response displays a list of objects with additional attributes.

Responses

Response content type

Code

Description

200

OK

Example Value | Model

```
{
  "links": {
    "parent": "string",
    "self": "string"
  },
  "paging": {
    "pages": 0,
    "offset": 0,
    "limit": 0,
    "count": 0
  },
  "items": [
    {
      "serverVersion": "string",
      "vdbVersion": "string",
      "metadata": {
        "lastUser": {
          "name": "string",
          "links": {
            "parent": "string",
            "self": "string"
          }
        }
      }
    }
  ]
}
```

GET /api/fmc_platform/v1/info/serverversion

API Operation for Server Version.

Parameters

Cancel

Name	Description
offset integer (query)	Index of first item to return. <input type="text" value="offset - Index of first item to return."/>
limit integer (query)	Number of items to return. <input type="text" value="limit - Number of items to return."/>
expanded boolean (query)	If set to true, the GET response displays a list of objects with additional attributes. <input type="text" value="--"/>

Execute

Responses

Response content type

Code Description

200

OK

Example Value | Model

```
{
  "links": {
    "parent": "string",
    "self": "string"
  },
  "paging": {
    "pages": 0,
    "offset": 0,
    "limit": 0,
    "count": 0
  },
  "items": [
    {
      "serverVersion": "string",
      "vdbVersion": "string",
      "metadata": {
        "lastUser": {
          "name": "string",
          "links": {
```

Responses

Response content type application/json

Curl

```
curl -X GET "https://fmcrestapisandbox.cisco.com/api/fmc_platform/v1/info/serverversion" -H "accept: application/json" -H "X-auth-access-token: 884b1f8c-6009-4968-94ae-48b3708359c5"
```

Request URL

```
https://fmcrestapisandbox.cisco.com/api/fmc_platform/v1/info/serverversion
```

Server response

Code Details

200

Response body

```
{
  "links": {
    "self": "https://fmcrestapisandbox.cisco.com/api/fmc_platform/v1/info/serverversion?offset=0&limit=1"
  },
  "items": [
    {
      "serverVersion": "6.4.0 (build 102)",
      "geoVersion": "None",
      "vdiVersion": "build 309 ( 2019-02-08 19:48:25 )",
      "aruVersion": "2018-10-10-001-vrt",
      "type": "ServerVersion"
    }
  ],
  "paging": {
    "offset": 0,
    "limit": 1,
    "count": 1,
    "pages": 1
  }
}
```

Download

Response headers

```
accept-ranges: bytes
cache-control: no-cache="Set-Cookie, Set-Cookie2"
connection: Keep-Alive
content-encoding: gzip
content-type: application/json
date: Sun, 04 Jul 2021 18:29:52 GMT
keep-alive: timeout=5, max=100
server: Apache
strict-transport-security: max-age=31536000; includeSubDomains
transfer-encoding: chunked
vary: Accept-Charset,Accept-Encoding,Accept-Language,Accept
x-frame-options: SAMEORIGIN
x-ua-compatible: IE=edge
```

```
ch12 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch12 — -zsh — 122x36
→ ch12 git:(main) * python3 authenticate.py 29
Authenticated succesfully! 30
Global: e276abec-e0f2-11e3-8169-6d9ed49b625f 31
→ ch12 git:(main) * 32
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else:
    print(f"Failed to authenticate. Response code: {resp.status_code}")
    sys.exit(-1)

sess, domains = get_authenticated_session(username, password, base_url)

url = f"{base_url}/api/fmc_config/v1/domain/{domain}/policy/access_rules"

resp = sess.get(url)
if resp.ok:
    data = resp.json()

    if 'urls' in data.keys():
        del data['urls']

    if 'metadata' in data.keys():
        del data['metadata']

    if 'links' in data.keys():
        del data['links']

print(json.dumps(data, indent=2))
data['name'] = 'Test-API'

r = sess.put(url, json=data)
print(r.status_code)
print(r.json())
```

> OUTLINE
> TIMELINE


```
ch12 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch12 — zsh — 122x36
+ ch12 git:(main) * python3 get_access_policies.py
Authenticated successfully!
Requesting url 'https://fmcrestapisandbox.cisco.com/api/fmc_config/v1/domain/e276abec-e0f2-11e3-8169-6d9ed49b625f/policy/acc
cesspolicies?offset=25&limit=25'
Requesting url 'https://fmcrestapisandbox.cisco.com/api/fmc_config/v1/domain/e276abec-e0f2-11e3-8169-6d9ed49b625f/policy/acc
cesspolicies?offset=50&limit=24'
001-Abdur-Access-Policy: 005056BB-0B24-0ed3-0000-914828049304
111-TestAccessPolicy: 005056BB-0B24-0ed3-0000-914828038381
AbraCadabra: 005056BB-0B24-0ed3-0000-910533271286
AC-AccessPolicy-Yurii-Test-123: 005056BB-0B24-0ed3-0000-910533238431
AC-AccessPolicy-Yurii-Test-12345: 005056BB-0B24-0ed3-0000-910533228176
AC-AO_policy: 005056BB-0B24-0ed3-0000-910533222679
AC-AO_Policy1620301336016: 005056BB-0B24-0ed3-0000-910533230107
AC-AO_Policy1620301719494: 005056BB-0B24-0ed3-0000-910533230272
AC-AO_Policy1620311938960: 005056BB-0B24-0ed3-0000-910533231303
AC-AO_Policy1620392257777: 005056BB-0B24-0ed3-0000-910533234261
AC-AO_Policy1620906354454: 005056BB-0B24-0ed3-0000-910533238822
AC-None: 005056BB-0B24-0ed3-0000-910533223321
AC-Deny_PolicyCheck: 005056BB-0B24-0ed3-0000-910533244219
AC_TEST_NAG: 005056BB-0B24-0ed3-0000-910533234530
Access-Policy-Intrusion-Prevention: 005056BB-0B24-0ed3-0000-910533210438
AccessPolicy-Max-Test-123: 005056BB-0B24-0ed3-0000-910533240043
AccessPolicy-veer-test-1: 005056BB-0B24-0ed3-0000-910533202633
AccessPolicy-veer-test-PM: 005056BB-0B24-0ed3-0000-910533238568
AccessPolicy-veer-test-PM3: 005056BB-0B24-0ed3-0000-910533238683
AccessPolicy-Yurii-Test-123: 005056BB-0B24-0ed3-0000-910533210712
Akankshu-Policy: 005056BB-0B24-0ed3-0000-910533270048
Amit_AccessPolicy1: 005056BB-0B24-0ed3-0000-914828036097
AO_Policy1620914986291: 005056BB-0B24-0ed3-0000-910533239658
AO_Policy1620915524459: 005056BB-0B24-0ed3-0000-910533239795
AO_Policy1622019020541: 005056BB-0B24-0ed3-0000-910533263808
AO_Policy1622019135136: 005056BB-0B24-0ed3-0000-910533263935
DenyAccessControlPolicy: 005056BB-0B24-0ed3-0000-910533241750
DenyPolicyPostManTest: 005056BB-0B24-0ed3-0000-910533243320
DenyRulepolicy: 005056BB-0B24-0ed3-0000-910533242215
DNE Security Access Control Policy: 005056BB-0B24-0ed3-0000-914828038204
```

```
ch12 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch12 — -zsh — 122x36
+ ch12 git:(main) * python3 get_access_policies.py
Authenticated successfully!
Requesting url 'https://fmcrestapisandbox.cisco.com/api/fmc_config/v1/domain/e276abec-e0f2-11e3-8169-6d9ed49b625f/policy/acc
cesspolicies?offset=25&limit=25'
Requesting url 'https://fmcrestapisandbox.cisco.com/api/fmc_config/v1/domain/e276abec-e0f2-11e3-8169-6d9ed49b625f/policy/acc
cesspolicies?offset=50&limit=24'
001-Abdur-Access-Policy: 005056BB-0B24-0ed3-0000-914828049304
111-TestAccessPolicy: 005056BB-0B24-0ed3-0000-914828038381
AbraCadabra: 005056BB-0B24-0ed3-0000-910533271286
AC-AccessPolicy-Yurii-Test-123: 005056BB-0B24-0ed3-0000-910533238431
AC-AccessPolicy-Yurii-Test-12345: 005056BB-0B24-0ed3-0000-910533228176
AC-AO_policy: 005056BB-0B24-0ed3-0000-910533222679
AC-AO_Policy1620301336016: 005056BB-0B24-0ed3-0000-910533230107
AC-AO_Policy1620301719494: 005056BB-0B24-0ed3-0000-910533230272
AC-AO_Policy1620311938960: 005056BB-0B24-0ed3-0000-910533231303
AC-AO_Policy1620392257777: 005056BB-0B24-0ed3-0000-910533234261
AC-AO_Policy1620906354454: 005056BB-0B24-0ed3-0000-910533238822
AC-None: 005056BB-0B24-0ed3-0000-910533223321
AC-Deny_PolicyCheck: 005056BB-0B24-0ed3-0000-910533244219
AC_TEST_NAG: 005056BB-0B24-0ed3-0000-910533234530
Access-Policy-Intrusion-Prevention: 005056BB-0B24-0ed3-0000-910533210438
AccessPolicy-Max-Test-123: 005056BB-0B24-0ed3-0000-910533240043
AccessPolicy-veer-test-1: 005056BB-0B24-0ed3-0000-910533202633
AccessPolicy-veer-test-PM: 005056BB-0B24-0ed3-0000-910533238568
AccessPolicy-veer-test-PM3: 005056BB-0B24-0ed3-0000-910533238683
AccessPolicy-Yurii-Test-123: 005056BB-0B24-0ed3-0000-910533210712
Akankshu-Policy: 005056BB-0B24-0ed3-0000-910533270048
Amit_AccessPolicy1: 005056BB-0B24-0ed3-0000-914828036097
AO_Policy1620914986291: 005056BB-0B24-0ed3-0000-910533239658
AO_Policy1620915524459: 005056BB-0B24-0ed3-0000-910533239795
AO_Policy1622019020541: 005056BB-0B24-0ed3-0000-910533263808
AO_Policy1622019135136: 005056BB-0B24-0ed3-0000-910533263935
DenyAccessControlPolicy: 005056BB-0B24-0ed3-0000-910533241750
DenyPolicyPostManTest: 005056BB-0B24-0ed3-0000-910533243320
DenyRulepolicy: 005056BB-0B24-0ed3-0000-910533242215
DNE Security Access Control Policy: 005056BB-0B24-0ed3-0000-914828038204
```

```
ch12 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch12 — -zsh — 122x36
→ ch12 git:(main) * python3 get_access_rules.py
Authenticated successfully!
111-TestRule(005056BB-0B24-0ed3-0000-000268494881): Action: ALLOW Enabled: True
SX0-Rule-7424b86d-ca9a-4fab(005056BB-0B24-0ed3-0000-000268494912): Action: BLOCK Enabled: True
SX0-Rule-95775623-4050-43f0(005056BB-0B24-0ed3-0000-000268494913): Action: BLOCK Enabled: True
SX0-Rule-09638683-7ef5-45fa(005056BB-0B24-0ed3-0000-000268494914): Action: BLOCK Enabled: True
SX0-Rule-1f56bd0c-f80e-4614(005056BB-0B24-0ed3-0000-000268494915): Action: BLOCK Enabled: True
→ ch12 git:(main) * less policy.py
  change_access_rules.py      U      35
  delete_access_rule.py       U      36
  get_access_policies.py      U      37
  get_access_rules.py         U      38
  sess_policy.py              U      39
  url = f"{base_url}/api/fmc_config/v1/domain/{domain}/policy/acc
  resp = sess.get(url)
  if resp.ok:
  data = resp.json()
  if 'urls' in data.keys():
  del data['urls']
  if 'metadata' in data.keys():
  del data['metadata']
  if 'links' in data.keys():
  del data['links']
  print(json.dumps(data, indent=2))
  data['name'] = 'Test-API'
  r = sess.put(url, json=data)
  print(r.status_code)
  print(r.json())
  > OUTLINE
  > TIMELINE
```

```
ch12 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch12 — -zsh — 122x36
→ ch12 git:(main) * python3 change_access_rules.py
Authenticated successfully!
Updated access rule SX0-Rule-1f56bd0c-f80e-4614
→ ch12 git:(main) * █

CH12
├── authenticate.py
├── change_access_policy.py
├── change_access_rules.py
├── delete_access_rule.py
├── get_access_policies.py
├── get_access_rules.py
└── ...

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else:
    print(f"Failed to authenticate. Response code: {resp.status_code}")
    sys.exit(-1)

sess, domains = get_authenticated_session(username, password, base_url)

url = f"{base_url}/api/fmc_config/v1/domain/{domain}/policy/access_rules"

resp = sess.get(url)
if resp.ok:
    data = resp.json()

    if 'urls' in data.keys():
        del data['urls']

    if 'metadata' in data.keys():
        del data['metadata']

    if 'links' in data.keys():
        del data['links']

print(json.dumps(data, indent=2))
data['name'] = 'Test-API'

r = sess.put(url, json=data)
print(r.status_code)
print(r.json())
```

```
ch12 — marcel@Marcel's-MacBook-Pro — ..Cookbook/ch12 — -zsh — 122x36
→ ch12 git:(main) * python3 delete_access_rule.py
Authenticated successfully!
Deleted rule with id 005056BB-0B24-0ed3-0000-000268494915
→ ch12 git:(main) * |

CH12
├── authenticate.py
├── change_access_policy.py
├── change_access_rules.py
├── delete_access_rule.py
├── get_access_policies.py
└── get_access_rules.py

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else:
    print(f"Failed to authenticate. Response code: {resp.status_code}")
    sys.exit(-1)

sess, domains = get_authenticated_session(username, password, base_url)

url = f"{base_url}/api/fmc_config/v1/domain/{domain}/policy/access_rules"

resp = sess.get(url)
if resp.ok:
    data = resp.json()

    if 'urls' in data.keys():
        del data['urls']

    if 'metadata' in data.keys():
        del data['metadata']

    if 'links' in data.keys():
        del data['links']

print(json.dumps(data, indent=2))
data['name'] = 'Test-API'

r = sess.put(url, json=data)
print(r.status_code)
print(r.json())
```