

37-cloud

April 29, 2016

1 cloud computing

- Amazon Web Services has a comprehensive python interface, 'boto3' for controlling the cloud
- [interesting article about how Netflix uses Python on AWS](#)
- [docs](#)

```
In [1]: from boto3 import *
```

```
ec2c = client('ec2')
```

```
In [2]: # nothing running now
```

```
ec2c.describe_instances(  
    Filters=[{'Name': 'instance-state-name', 'Values': ['running']}])
```

```
Out[2]: {'Reservations': [],  
        'ResponseMetadata': {'HTTPStatusCode': 200,  
                             'RequestId': 'e7f30a81-bf87-45c5-b694-331aded02a88'}}
```

```
In [3]: # the image we will boot
```

```
ami = 'ami-08111162'
```

```
ec2r=resource('ec2')
```

```
ec2r.create_instances(ImageId=ami,  
                      MinCount=2, MaxCount=2,  
                      InstanceType='t2.micro')
```

```
Out[3]: [ec2.Instance(id='i-0abfdac46a197bb1f'),  
        ec2.Instance(id='i-03c136aec55551b62')]
```

```
In [4]: di = ec2c.describe_instances(  
    Filters=[{'Name': 'instance-state-name', 'Values': ['running']}])
```

```
di
```

```
Out[4]: {'Reservations': [{'Groups': [],  
                           'Instances': [{'AmiLaunchIndex': 0,  
                                           'Architecture': 'x86_64',  
                                           'BlockDeviceMappings': [{'DeviceName': '/dev/xvda',  
                                                                     'Ebs': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 7, tzinfo=tzutc()),  
                                                                     'DeleteOnTermination': True,  
                                                                     'Status': 'attached',
```

```

    'VolumeId': 'vol-96d99947'}]],
  'ClientToken': '',
  'EbsOptimized': False,
  'Hypervisor': 'xen',
  'ImageId': 'ami-08111162',
  'InstanceId': 'i-0abfdac46a197bb1f',
  'InstanceType': 't2.micro',
  'LaunchTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
  'Monitoring': {'State': 'disabled'},
  'NetworkInterfaces': [{'Association': {'IpOwnerId': 'amazon',
    'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
    'PublicIp': '54.172.214.137'}},
    'Attachment': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
    'AttachmentId': 'eni-attach-a466b354',
    'DeleteOnTermination': True,
    'DeviceIndex': 0,
    'Status': 'attached'}},
  'Description': '',
  'Groups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
  'MacAddress': '12:de:23:b9:7a:eb',
  'NetworkInterfaceId': 'eni-60968c44',
  'OwnerId': '674776699098',
  'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',
  'PrivateIpAddress': '172.31.55.94',
  'PrivateIpAddresses': [{'Association': {'IpOwnerId': 'amazon',
    'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
    'PublicIp': '54.172.214.137'}},
    'Primary': True,
    'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',
    'PrivateIpAddress': '172.31.55.94'}],
  'SourceDestCheck': True,
  'Status': 'in-use',
  'SubnetId': 'subnet-881a9aa2',
  'VpcId': 'vpc-dc8493b8'}],
  'Placement': {'AvailabilityZone': 'us-east-1c',
    'GroupName': '',
    'Tenancy': 'default'},
  'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',
  'PrivateIpAddress': '172.31.55.94',
  'ProductCodes': [],
  'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
  'PublicIpAddress': '54.172.214.137',
  'RootDeviceName': '/dev/xvda',
  'RootDeviceType': 'ebs',
  'SecurityGroups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
  'SourceDestCheck': True,
  'State': {'Code': 16, 'Name': 'running'},
  'StateTransitionReason': '',
  'SubnetId': 'subnet-881a9aa2',
  'VirtualizationType': 'hvm',
  'VpcId': 'vpc-dc8493b8'},
  {'AmiLaunchIndex': 1,
    'Architecture': 'x86_64',
    'BlockDeviceMappings': [{'DeviceName': '/dev/xvda',

```

```

'Ebs': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 7, tzinfo=tzutc()),
'DeleteOnTermination': True,
'Status': 'attached',
'VolumeId': 'vol-f9d99928'}}],
'ClientToken': '',
'EbsOptimized': False,
'Hypervisor': 'xen',
'ImageId': 'ami-08111162',
'InstanceId': 'i-03c136aec55551b62',
'InstanceType': 't2.micro',
'LaunchTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
'Monitoring': {'State': 'disabled'},
'NetworkInterfaces': [{'Association': {'IpOwnerId': 'amazon',
'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',
'PublicIp': '52.87.226.203'},
'Attachment': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
'AttachmentId': 'eni-attach-a566b355',
'DeleteOnTermination': True,
'DeviceIndex': 0,
'Status': 'attached'},
'Description': '',
'Groups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
'MacAddress': '12:c9:07:b7:9d:6f',
'NetworkInterfaceId': 'eni-61968c45',
'OwnerId': '674776699098',
'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
'PrivateIpAddress': '172.31.55.95',
'PrivateIpAddresses': [{'Association': {'IpOwnerId': 'amazon',
'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',
'PublicIp': '52.87.226.203'},
'Primary': True,
'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
'PrivateIpAddress': '172.31.55.95'}],
'SourceDestCheck': True,
'Status': 'in-use',
'SubnetId': 'subnet-881a9aa2',
'VpcId': 'vpc-dc8493b8'}],
'Placement': {'AvailabilityZone': 'us-east-1c',
'GroupName': '',
'Tenancy': 'default'},
'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
'PrivateIpAddress': '172.31.55.95',
'ProductCodes': [],
'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',
'PublicIpAddress': '52.87.226.203',
'RootDeviceName': '/dev/xvda',
'RootDeviceType': 'ebs',
'SecurityGroups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
'SourceDestCheck': True,
'State': {'Code': 16, 'Name': 'running'},
'StateTransitionReason': '',
'SubnetId': 'subnet-881a9aa2',
'VirtualizationType': 'hvm',
'VpcId': 'vpc-dc8493b8'}],

```

```

    'OwnerId': '674776699098',
    'ReservationId': 'r-04e9955fbff3c40f9']],
    'ResponseMetadata': {'HTTPStatusCode': 200,
    'RequestId': 'aa874b52-3f5a-4765-aaac-e1b19f339eba'}}

```

```

In [6]: di2 = di['Reservations']
        di2

```

```

Out[6]: [{'Groups': [],
  'Instances': [{'AmiLaunchIndex': 0,
    'Architecture': 'x86_64',
    'BlockDeviceMappings': [{'DeviceName': '/dev/xvda',
    'Ebs': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 7, tzinfo=tzutc()),
    'DeleteOnTermination': True,
    'Status': 'attached',
    'VolumeId': 'vol-96d99947'}}]],
    'ClientToken': '',
    'EbsOptimized': False,
    'Hypervisor': 'xen',
    'ImageId': 'ami-08111162',
    'InstanceId': 'i-0abfdac46a197bb1f',
    'InstanceType': 't2.micro',
    'LaunchTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
    'Monitoring': {'State': 'disabled'},
    'NetworkInterfaces': [{'Association': {'IpOwnerId': 'amazon',
    'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
    'PublicIp': '54.172.214.137'},
    'Attachment': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
    'AttachmentId': 'eni-attach-a466b354',
    'DeleteOnTermination': True,
    'DeviceIndex': 0,
    'Status': 'attached'},
    'Description': '',
    'Groups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
    'MacAddress': '12:de:23:b9:7a:eb',
    'NetworkInterfaceId': 'eni-60968c44',
    'OwnerId': '674776699098',
    'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',
    'PrivateIpAddress': '172.31.55.94',
    'PrivateIpAddresses': [{'Association': {'IpOwnerId': 'amazon',
    'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
    'PublicIp': '54.172.214.137'},
    'Primary': True,
    'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',
    'PrivateIpAddress': '172.31.55.94'}],
    'SourceDestCheck': True,
    'Status': 'in-use',
    'SubnetId': 'subnet-881a9aa2',
    'VpcId': 'vpc-dc8493b8'}],
    'Placement': {'AvailabilityZone': 'us-east-1c',
    'GroupName': '',
    'Tenancy': 'default'},
    'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',
    'PrivateIpAddress': '172.31.55.94',
    'ProductCodes': [],

```

```

'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
'PublicIpAddress': '54.172.214.137',
'RootDeviceName': '/dev/xvda',
'RootDeviceType': 'ebs',
'SecurityGroups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
'SourceDestCheck': True,
'State': {'Code': 16, 'Name': 'running'},
'StateTransitionReason': '',
'SubnetId': 'subnet-881a9aa2',
'VirtualizationType': 'hvm',
'VpcId': 'vpc-dc8493b8'},
{'AmiLaunchIndex': 1,
'Architecture': 'x86_64',
'BlockDeviceMappings': [{'DeviceName': '/dev/xvda',
'Ebs': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 7, tzinfo=tzutc()),
'DeleteOnTermination': True,
'Status': 'attached',
'VolumeId': 'vol-f9d99928'}}],
'ClientToken': '',
'EbsOptimized': False,
'Hypervisor': 'xen',
'ImageId': 'ami-08111162',
'InstanceId': 'i-03c136aec55551b62',
'InstanceType': 't2.micro',
'LaunchTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
'Monitoring': {'State': 'disabled'},
'NetworkInterfaces': [{'Association': {'IpOwnerId': 'amazon',
'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',
'PublicIp': '52.87.226.203'},
'Attachment': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
'AttachmentId': 'eni-attach-a566b355',
'DeleteOnTermination': True,
'DeviceIndex': 0,
'Status': 'attached'},
'Description': '',
'Groups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
'MacAddress': '12:c9:07:b7:9d:6f',
'NetworkInterfaceId': 'eni-61968c45',
'OwnerId': '674776699098',
'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
'PrivateIpAddress': '172.31.55.95',
'PrivateIpAddresses': [{'Association': {'IpOwnerId': 'amazon',
'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',
'PublicIp': '52.87.226.203'},
'Primary': True,
'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
'PrivateIpAddress': '172.31.55.95'}],
'SourceDestCheck': True,
'Status': 'in-use',
'SubnetId': 'subnet-881a9aa2',
'VpcId': 'vpc-dc8493b8'}],
'Placement': {'AvailabilityZone': 'us-east-1c',
'GroupName': '',
'Tenancy': 'default'},

```

```

'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
'PrivateIpAddress': '172.31.55.95',
'ProductCodes': [],
'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',
'PublicIpAddress': '52.87.226.203',
'RootDeviceName': '/dev/xvda',
'RootDeviceType': 'ebs',
'SecurityGroups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
'SourceDestCheck': True,
'State': {'Code': 16, 'Name': 'running'},
'StateTransitionReason': '',
'SubnetId': 'subnet-881a9aa2',
'VirtualizationType': 'hvm',
'VpcId': 'vpc-dc8493b8'}],
'OwnerId': '674776699098',
'ReservationId': 'r-04e9955fbff3c40f9'}]

```

```

In [7]: di3=di2[0]['Instances']
        di3

```

```

Out[7]: [{'AmiLaunchIndex': 0,
'Architecture': 'x86_64',
'BlockDeviceMappings': [{'DeviceName': '/dev/xvda',
'Ebs': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 7, tzinfo=tzutc()),
'DeleteOnTermination': True,
'Status': 'attached',
'VolumeId': 'vol-96d99947'}}],
'ClientToken': '',
'EbsOptimized': False,
'Hypervisor': 'xen',
'ImageId': 'ami-08111162',
'InstanceId': 'i-0abfdac46a197bb1f',
'InstanceType': 't2.micro',
'LaunchTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
'Monitoring': {'State': 'disabled'},
'NetworkInterfaces': [{'Association': {'IpOwnerId': 'amazon',
'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
'PublicIp': '54.172.214.137'},
'Attachment': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
'AttachmentId': 'eni-attach-a466b354',
'DeleteOnTermination': True,
'DeviceIndex': 0,
'Status': 'attached'},
'Description': '',
'Groups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
'MacAddress': '12:de:23:b9:7a:eb',
'NetworkInterfaceId': 'eni-60968c44',
'OwnerId': '674776699098',
'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',
'PrivateIpAddress': '172.31.55.94',
'PrivateIpAddresses': [{'Association': {'IpOwnerId': 'amazon',
'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
'PublicIp': '54.172.214.137'},
'Primary': True,
'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',

```

```

    'PrivateIpAddress': '172.31.55.94'}],
    'SourceDestCheck': True,
    'Status': 'in-use',
    'SubnetId': 'subnet-881a9aa2',
    'VpcId': 'vpc-dc8493b8'}],
    'Placement': {'AvailabilityZone': 'us-east-1c',
    'GroupName': '',
    'Tenancy': 'default'},
    'PrivateDnsName': 'ip-172-31-55-94.ec2.internal',
    'PrivateIpAddress': '172.31.55.94',
    'ProductCodes': [],
    'PublicDnsName': 'ec2-54-172-214-137.compute-1.amazonaws.com',
    'PublicIpAddress': '54.172.214.137',
    'RootDeviceName': '/dev/xvda',
    'RootDeviceType': 'ebs',
    'SecurityGroups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
    'SourceDestCheck': True,
    'State': {'Code': 16, 'Name': 'running'},
    'StateTransitionReason': '',
    'SubnetId': 'subnet-881a9aa2',
    'VirtualizationType': 'hvm',
    'VpcId': 'vpc-dc8493b8'},
    {'AmiLaunchIndex': 1,
    'Architecture': 'x86_64',
    'BlockDeviceMappings': [{'DeviceName': '/dev/xvda',
    'Ebs': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 7, tzinfo=tzutc()),
    'DeleteOnTermination': True,
    'Status': 'attached',
    'VolumeId': 'vol-f9d99928'}}],
    'ClientToken': '',
    'EbsOptimized': False,
    'Hypervisor': 'xen',
    'ImageId': 'ami-08111162',
    'InstanceId': 'i-03c136aec55551b62',
    'InstanceType': 't2.micro',
    'LaunchTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
    'Monitoring': {'State': 'disabled'},
    'NetworkInterfaces': [{'Association': {'IpOwnerId': 'amazon',
    'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',
    'PublicIp': '52.87.226.203'},
    'Attachment': {'AttachTime': datetime.datetime(2016, 4, 29, 19, 32, 6, tzinfo=tzutc()),
    'AttachmentId': 'eni-attach-a566b355',
    'DeleteOnTermination': True,
    'DeviceIndex': 0,
    'Status': 'attached'},
    'Description': '',
    'Groups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
    'MacAddress': '12:c9:07:b7:9d:6f',
    'NetworkInterfaceId': 'eni-61968c45',
    'OwnerId': '674776699098',
    'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
    'PrivateIpAddress': '172.31.55.95',
    'PrivateIpAddresses': [{'Association': {'IpOwnerId': 'amazon',
    'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',

```

```

        'PublicIp': '52.87.226.203'},
        'Primary': True,
        'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
        'PrivateIpAddress': '172.31.55.95'}],
    'SourceDestCheck': True,
    'Status': 'in-use',
    'SubnetId': 'subnet-881a9aa2',
    'VpcId': 'vpc-dc8493b8'}],
    'Placement': {'AvailabilityZone': 'us-east-1c',
    'GroupName': '',
    'Tenancy': 'default'},
    'PrivateDnsName': 'ip-172-31-55-95.ec2.internal',
    'PrivateIpAddress': '172.31.55.95',
    'ProductCodes': [],
    'PublicDnsName': 'ec2-52-87-226-203.compute-1.amazonaws.com',
    'PublicIpAddress': '52.87.226.203',
    'RootDeviceName': '/dev/xvda',
    'RootDeviceType': 'ebs',
    'SecurityGroups': [{'GroupId': 'sg-f187a289', 'GroupName': 'default'}],
    'SourceDestCheck': True,
    'State': {'Code': 16, 'Name': 'running'},
    'StateTransitionReason': '',
    'SubnetId': 'subnet-881a9aa2',
    'VirtualizationType': 'hvm',
    'VpcId': 'vpc-dc8493b8'}]

```

In [8]: # Finally, the running instance ids!

```

ids = [d['InstanceId'] for d in di3]
ids

```

Out[8]: ['i-0abfdac46a197bb1f', 'i-03c136aec55551b62']

In [9]: # now with the ids, we can terminate the instances

```

ec2c.terminate_instances(InstanceIds=ids)

```

```

Out[9]: {'ResponseMetadata': {'HTTPStatusCode': 200,
    'RequestId': 'b6c6073f-9388-451a-8f14-12996335d7c7'},
    'TerminatingInstances': [{'CurrentState': {'Code': 32,
    'Name': 'shutting-down'},
    'InstanceId': 'i-03c136aec55551b62',
    'PreviousState': {'Code': 16, 'Name': 'running'}},
    {'CurrentState': {'Code': 32, 'Name': 'shutting-down'},
    'InstanceId': 'i-0abfdac46a197bb1f',
    'PreviousState': {'Code': 16, 'Name': 'running'}}]}

```

2 OpenStack

- open source version of Amazon cloud system
- also has a python interface
- OpenStack itself is mostly written in Python
 - largest known Python project
 - almost two million lines of code
- [docs](#)