Python 代码示例

ONTAP Select

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Python 代码示例

用于创建集群的脚本

您可以使用以下脚本根据脚本和 JSON 输入文件中定义的参数创建集群。

```
#!/usr/bin/env python
##----------------------------------------------------------------------
#
# File: cluster.py
#
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#
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#
##----------------------------------------------------------------------

import traceback
import argparse
import json
import logging

from deploy_requests import DeployRequests


def add_vcenter_credentials(deploy, config):
    """ Add credentials for the vcenter if present in the config """
    log_debug_trace()

    vcenter = config.get('vcenter', None)
    if vcenter and not deploy.resource_exists('/security/credentials',
                                              'hostname', vcenter
['hostname']):
        log_info("Registering vcenter {} credentials".format(vcenter
['hostname']))
        data = {k: vcenter[k] for k in ['hostname', 'username',
'password']}
```

```
        data['type'] = "vcenter"
        deploy.post('/security/credentials', data)


def add_standalone_host_credentials(deploy, config):
    """ Add credentials for standalone hosts if present in the config.
        Does nothing if the host credential already exists on the Deploy.
    """
    log_debug_trace()

    hosts = config.get('hosts', [])
    for host in hosts:
        # The presense of the 'password' will be used only for standalone
hosts.
        # If this host is managed by a vcenter, it should not have a host
'password' in the json.
        if 'password' in host and not deploy.resource_exists
('/security/credentials',
                                                          'hostname',
host['name']):
            log_info("Registering host {} credentials".format(host[
'name']))
            data = {'hostname': host['name'], 'type': 'host',
                    'username': host['username'], 'password': host
['password']}
            deploy.post('/security/credentials', data)


def register_unkown_hosts(deploy, config):
    ''' Registers all hosts with the deploy server.
        The host details are read from the cluster config json file.

        This method will skip any hosts that are already registered.
        This method will exit the script if no hosts are found in the
config.
    '''
    log_debug_trace()

    data = {"hosts": []}
    if 'hosts' not in config or not config['hosts']:
        log_and_exit("The cluster config requires at least 1 entry in the
'hosts' list got {}".format(config))

    missing_host_cnt = 0
    for host in config['hosts']:
        if not deploy.resource_exists('/hosts', 'name', host['name']):
```

```
            missing_host_cnt += 1
            host_config = {"name": host['name'], "hypervisor_type": host
['type']}
            if 'mgmt_server' in host:
                host_config["management_server"] = host['mgmt_server']
                log_info(
                   "Registering from vcenter {mgmt_server}".format(**
host))

            if 'password' in host and 'user' in host:
                host_config['credential'] = {
                    "password": host['password'], "username": host[
'user']}

            log_info("Registering {type} host {name}".format(**host))
            data["hosts"].append(host_config)

    # only post /hosts if some missing hosts were found
    if missing_host_cnt:
        deploy.post('/hosts', data, wait_for_job=True)


def add_cluster_attributes(deploy, config):
    ''' POST a new cluster with all needed attribute values.
        Returns the cluster_id of the new config
    '''
    log_debug_trace()

    cluster_config = config['cluster']
    cluster_id = deploy.find_resource('/clusters', 'name', cluster_config
['name'])

    if not cluster_id:
        log_info("Creating cluster config named {name}".format(
**cluster_config))

        # Filter to only the valid attributes, ignores anything else in
the json
        data = {k: cluster_config[k] for k in [
            'name', 'ip', 'gateway', 'netmask', 'ontap_image_version',
'dns_info', 'ntp_servers']}

        num_nodes = len(config['nodes'])

        log_info("Cluster properties: {}".format(data))

        resp = deploy.post('/v3/clusters?node_count={}'.format(num_nodes),
```

```
data)
        cluster_id = resp.headers.get('Location').split('/')[-1]

    return cluster_id


def get_node_ids(deploy, cluster_id):
    ''' Get the the ids of the nodes in a cluster. Returns a list of
node_ids.'''
    log_debug_trace()

    response = deploy.get('/clusters/{}/nodes'.format(cluster_id))
    node_ids = [node['id'] for node in response.json().get('records')]
    return node_ids


def add_node_attributes(deploy, cluster_id, node_id, node):
    ''' Set all the needed properties on a node '''
    log_debug_trace()

    log_info("Adding node '{}' properties".format(node_id))

    data = {k: node[k] for k in ['ip', 'serial_number', 'instance_type',
                                 'is_storage_efficiency_enabled'] if k in
node}
    # Optional: Set a serial_number
    if 'license' in node:
        data['license'] = {'id': node['license']}

    # Assign the host
    host_id = deploy.find_resource('/hosts', 'name', node['host_name'])
    if not host_id:
        log_and_exit("Host names must match in the 'hosts' array, and the
nodes.host_name property")

    data['host'] = {'id': host_id}

    # Set the correct raid_type
    is_hw_raid = not node['storage'].get('disks')  # The presence of a
list of disks indicates sw_raid
    data['passthrough_disks'] = not is_hw_raid

    # Optionally set a custom node name
    if 'name' in node:
        data['name'] = node['name']

    log_info("Node properties: {}".format(data))
```

```
    deploy.patch('/clusters/{}/nodes/{}'.format(cluster_id, node_id),
data)


def add_node_networks(deploy, cluster_id, node_id, node):
    ''' Set the network information for a node '''
    log_debug_trace()

    log_info("Adding node '{}' network properties".format(node_id))

    num_nodes = deploy.get_num_records('/clusters/{}/nodes'.format
(cluster_id))

    for network in node['networks']:

        # single node clusters do not use the 'internal' network
        if num_nodes == 1 and network['purpose'] == 'internal':
            continue

        # Deduce the network id given the purpose for each entry
        network_id = deploy.find_resource(
'/clusters/{}/nodes/{}/networks'.format(cluster_id, node_id),
                                          'purpose', network['purpose'])
        data = {"name": network['name']}
        if 'vlan' in network and network['vlan']:
            data['vlan_id'] = network['vlan']

        deploy.patch('/clusters/{}/nodes/{}/networks/{}'.format(
cluster_id, node_id, network_id), data)


def add_node_storage(deploy, cluster_id, node_id, node):
    ''' Set all the storage information on a node '''
    log_debug_trace()

    log_info("Adding node '{}' storage properties".format(node_id))
    log_info("Node storage: {}".format(node['storage']['pools']))

    data = {'pool_array': node['storage']['pools']}  # use all the json
properties
    deploy.post(
        '/clusters/{}/nodes/{}/storage/pools'.format(cluster_id, node_id),
data)

    if 'disks' in node['storage'] and node['storage']['disks']:
        data = {'disks': node['storage']['disks']}
        deploy.post(
```

```
            '/clusters/{}/nodes/{}/storage/disks'.format(cluster_id,
node_id), data)


def create_cluster_config(deploy, config):
    ''' Construct a cluster config in the deploy server using the input
json data '''
    log_debug_trace()

    cluster_id = add_cluster_attributes(deploy, config)

    node_ids = get_node_ids(deploy, cluster_id)
    node_configs = config['nodes']

    for node_id, node_config in zip(node_ids, node_configs):
        add_node_attributes(deploy, cluster_id, node_id, node_config)
        add_node_networks(deploy, cluster_id, node_id, node_config)
        add_node_storage(deploy, cluster_id, node_id, node_config)

    return cluster_id


def deploy_cluster(deploy, cluster_id, config):
    ''' Deploy the cluster config to create the ONTAP Select VMs. '''
    log_debug_trace()
    log_info("Deploying cluster: {}".format(cluster_id))

    data = {'ontap_credential': {'password': config['cluster'
]['ontap_admin_password']}}
    deploy.post('/clusters/{}/deploy?inhibit_rollback=true'.format
(cluster_id),
                data, wait_for_job=True)


def log_debug_trace():
    stack = traceback.extract_stack()
    parent_function = stack[-2][2]
    logging.getLogger('deploy').debug('Calling %s()' % parent_function)


def log_info(msg):
    logging.getLogger('deploy').info(msg)


def log_and_exit(msg):
    logging.getLogger('deploy').error(msg)
    exit(1)
```

```
def configure_logging(verbose):
    FORMAT = '%(asctime)-15s:%(levelname)s:%(name)s: %(message)s'
    if verbose:
        logging.basicConfig(level=logging.DEBUG, format=FORMAT)
    else:
        logging.basicConfig(level=logging.INFO, format=FORMAT)
        logging.getLogger('requests.packages.urllib3.connectionpool'
).setLevel(
            logging.WARNING)


def main(args):
    configure_logging(args.verbose)
    deploy = DeployRequests(args.deploy, args.password)

    with open(args.config_file) as json_data:
        config = json.load(json_data)

        add_vcenter_credentials(deploy, config)

        add_standalone_host_credentials(deploy, config)

        register_unkown_hosts(deploy, config)

        cluster_id = create_cluster_config(deploy, config)

        deploy_cluster(deploy, cluster_id, config)


def parseArgs():
    parser = argparse.ArgumentParser(description='Uses the ONTAP Select
Deploy API to construct and deploy a cluster.')
    parser.add_argument('-d', '--deploy', help='Hostname or IP address of
Deploy server')
    parser.add_argument('-p', '--password', help='Admin password of Deploy
server')
    parser.add_argument('-c', '--config_file', help='Filename of the
cluster config')
    parser.add_argument('-v', '--verbose', help='Display extra debugging
messages for seeing exact API calls and responses',
                        action='store_true', default=False)
    return parser.parse_args()

if __name__ == '__main__':
    args = parseArgs()
```

```
    main(args)
```

用于创建集群的脚本的 JSON

在使用 Python 代码示例创建或删除 ONTAP Select 集群时，必须提供一个 JSON 文件作为脚本的输入。您可以根据部署计划复制和修改相应的 JSON 示例。

ESXi 上的单节点集群

```
{
  "hosts": [
    {
      "password": "mypassword1",
      "name": "host-1234",
      "type": "ESX",
      "username": "admin"
    }
  ],

  "cluster": {
    "dns_info": {
      "domains": ["lab1.company-demo.com", "lab2.company-demo.com",
        "lab3.company-demo.com", "lab4.company-demo.com"
        ],

      "dns_ips": ["10.206.80.135", "10.206.80.136"]
      },
      "ontap_image_version": "9.7",
      "gateway": "10.206.80.1",
      "ip": "10.206.80.115",
      "name": "mycluster",
      "ntp_servers": ["10.206.80.183", "10.206.80.142"],
      "ontap_admin_password": "mypassword2",
      "netmask": "255.255.254.0"
  },

  "nodes": [
    {
      "serial_number": "3200000nn",
      "ip": "10.206.80.114",
      "name": "node-1",
      "networks": [
        {
          "name": "ontap-external",
```

```
          "purpose": "mgmt",
          "vlan": 1234
        },
        {
          "name": "ontap-external",
          "purpose": "data",
          "vlan": null
        },
        {
          "name": "ontap-internal",
          "purpose": "internal",
          "vlan": null
        }
      ],
      "host_name": "host-1234",
      "is_storage_efficiency_enabled": false,
      "instance_type": "small",
      "storage": {
        "disk": [],
        "pools": [
          {
            "name": "storage-pool-1",
            "capacity": 4802666790125
          }
        ]
      }
    }
  ]
}
```

使用 vCenter 的 ESXi 上的单节点集群

```
{
  "hosts": [
    {
      "name":"host-1234",
      "type":"ESX",
      "mgmt_server":"vcenter-1234"
    }
  ],

  "cluster": {
    "dns_info": {"domains": ["lab1.company-demo.com", "lab2.company-
demo.com",
      "lab3.company-demo.com", "lab4.company-demo.com"
```

```
        ],
        "dns_ips": ["10.206.80.135","10.206.80.136"]
    },

    "ontap_image_version":"9.7",
    "gateway":"10.206.80.1",
    "ip":"10.206.80.115",
    "name":"mycluster",
    "ntp_servers": ["10.206.80.183","10.206.80.142"],
    "ontap_admin_password":"mypassword2",
    "netmask":"255.255.254.0"
    },

    "vcenter": {
      "password":"mypassword2",
      "hostname":"vcenter-1234",
      "username":"selectadmin"
    },

    "nodes": [
      {
        "serial_number": "3200000nn",
        "ip":"10.206.80.114",
        "name":"node-1",
        "networks": [
          {
            "name":"ONTAP-Management",
            "purpose":"mgmt",
            "vlan":null
          },
          {
            "name": "ONTAP-External",
            "purpose":"data",
            "vlan":null
          },
          {
            "name": "ONTAP-Internal",
            "purpose":"internal",
            "vlan":null
          }
        ],

        "host_name": "host-1234",
        "is_storage_efficiency_enabled": false,
        "instance_type": "small",
        "storage": {
```

```
        "disk":[],
        "pools": [
          {
            "name": "storage-pool-1",
            "capacity":5685190380748
          }
        ]
      }
    }
  ]
}
```

KVM 上的单节点集群

- 从ONTAP Select 9.10.1开始、您无法再在KVM虚拟机管理程序上部署新集群。
- 从ONTAP Select 9.11.1开始、除了脱机和删除功能之外、现有KVM集群和主机不再具有所有易管理性功能。

```
{
  "hosts": [
    {
      "password": "mypassword1",
      "name":"host-1234",
      "type":"KVM",
      "username":"root"
    }
  ],

  "cluster": {
    "dns_info": {
      "domains": ["lab1.company-demo.com", "lab2.company-demo.com",
        "lab3.company-demo.com", "lab4.company-demo.com"
      ],

      "dns_ips": ["10.206.80.135", "10.206.80.136"]
    },

    "ontap_image_version": "9.7",
    "gateway":"10.206.80.1",
    "ip":"10.206.80.115",
    "name":"CBF4ED97",
    "ntp_servers": ["10.206.80.183", "10.206.80.142"],
    "ontap_admin_password": "mypassword2",
    "netmask":"255.255.254.0"
```

```
  },
  "nodes": [
    {
      "serial_number":"3200000nn",
      "ip":"10.206.80.115",
      "name": "node-1",
      "networks": [
        {
          "name": "ontap-external",
          "purpose": "mgmt",
          "vlan":1234
        },
        {
          "name": "ontap-external",
          "purpose": "data",
          "vlan": null
        },
        {
          "name": "ontap-internal",
          "purpose": "internal",
          "vlan": null
        }
      ],

      "host_name": "host-1234",
      "is_storage_efficiency_enabled": false,
      "instance_type": "small",
      "storage": {
        "disk": [],
        "pools": [
          {
            "name": "storage-pool-1",
            "capacity": 4802666790125
          }
        ]
      }
    }
  ]
}
```

用于添加节点许可证的脚本

您可以使用以下脚本为 ONTAP Select 节点添加许可证。

```
#!/usr/bin/env python
```

```
##------------------------------------------------------------------------
#
# File: add_license.py
#
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#
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# that the software application product is distributed pursuant to terms
# no less restrictive than those set forth herein.
#
##------------------------------------------------------------------------

import argparse
import logging
import json

from deploy_requests import DeployRequests


def post_new_license(deploy, license_filename):
    log_info('Posting a new license: {}'.format(license_filename))

    # Stream the file as multipart/form-data
    deploy.post('/licensing/licenses', data={},
                files={'license_file': open(license_filename, 'rb')})

    # Alternative if the NLF license data is converted to a string.
    # with open(license_filename, 'rb') as f:
    #    nlf_data = f.read()
    #    r = deploy.post('/licensing/licenses', data={},
    #                    files={'license_file': (license_filename,
nlf_data)})


def put_license(deploy, serial_number, data, files):
    log_info('Adding license for serial number: {}'.format(serial_number))

    deploy.put('/licensing/licenses/{}'.format(serial_number), data=data,
files=files)
```

```
def put_used_license(deploy, serial_number, license_filename,
ontap_username, ontap_password):
    ''' If the license is used by an 'online' cluster, a username/password
must be given. '''

    data = {'ontap_username': ontap_username, 'ontap_password':
ontap_password}
    files = {'license_file': open(license_filename, 'rb')}

    put_license(deploy, serial_number, data, files)


def put_free_license(deploy, serial_number, license_filename):
    data = {}
    files = {'license_file': open(license_filename, 'rb')}

    put_license(deploy, serial_number, data, files)


def get_serial_number_from_license(license_filename):
    ''' Read the NLF file to extract the serial number '''
    with open(license_filename) as f:
        data = json.load(f)

        statusResp = data.get('statusResp', {})
        serialNumber = statusResp.get('serialNumber')
        if not serialNumber:
            log_and_exit("The license file seems to be missing the
serialNumber")

        return serialNumber


def log_info(msg):
    logging.getLogger('deploy').info(msg)


def log_and_exit(msg):
    logging.getLogger('deploy').error(msg)
    exit(1)


def configure_logging():
    FORMAT = '%(asctime)-15s:%(levelname)s:%(name)s: %(message)s'
    logging.basicConfig(level=logging.INFO, format=FORMAT)
    logging.getLogger('requests.packages.urllib3.connectionpool').
setLevel(logging.WARNING)
```

```
def main(args):
    configure_logging()
    serial_number = get_serial_number_from_license(args.license)

    deploy = DeployRequests(args.deploy, args.password)

    # First check if there is already a license resource for this serial-
number
    if deploy.find_resource('/licensing/licenses', 'id', serial_number):

        # If the license already exists in the Deploy server, determine if
its used
        if deploy.find_resource('/clusters', 'nodes.serial_number',
serial_number):

            # In this case, requires ONTAP creds to push the license to
the node
            if args.ontap_username and args.ontap_password:
                put_used_license(deploy, serial_number, args.license,
                                 args.ontap_username, args.ontap_password)
            else:
                print("ERROR: The serial number for this license is in
use. Please provide ONTAP credentials.")
        else:
            # License exists, but its not used
            put_free_license(deploy, serial_number, args.license)
    else:
        # No license exists, so register a new one as an available license
for later use
        post_new_license(deploy, args.license)


def parseArgs():
    parser = argparse.ArgumentParser(description='Uses the ONTAP Select
Deploy API to add or update a new or used NLF license file.')
    parser.add_argument('-d', '--deploy', required=True, type=str, help
='Hostname or IP address of ONTAP Select Deploy')
    parser.add_argument('-p', '--password', required=True, type=str, help
='Admin password of Deploy server')
    parser.add_argument('-l', '--license', required=True, type=str, help
='Filename of the NLF license data')
    parser.add_argument('-u', '--ontap_username', type=str,
                        help='ONTAP Select username with privelege to add
the license. Only provide if the license is used by a Node.')
```

```
    parser.add_argument('-o', '--ontap_password', type=str,
                        help='ONTAP Select password for the
ontap_username. Required only if ontap_username is given.')
    return parser.parse_args()

if __name__ == '__main__':
    args = parseArgs()
    main(args)
```

用于删除集群的脚本

您可以使用以下命令行界面脚本删除现有集群。

```
#!/usr/bin/env python
##------------------------------------------------------------------------
#
# File: delete_cluster.py
#
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#
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# that the software application product is distributed pursuant to terms
# no less restrictive than those set forth herein.
#
##------------------------------------------------------------------------

import argparse
import json
import logging

from deploy_requests import DeployRequests

def find_cluster(deploy, cluster_name):
    return deploy.find_resource('/clusters', 'name', cluster_name)


def offline_cluster(deploy, cluster_id):
    # Test that the cluster is online, otherwise do nothing
    response = deploy.get('/clusters/{}?fields=state'.format(cluster_id))
```

```
    cluster_data = response.json()['record']
    if cluster_data['state'] == 'powered_on':
        log_info("Found the cluster to be online, modifying it to be
powered_off.")
        deploy.patch('/clusters/{}'.format(cluster_id), {'availability':
'powered_off'}, True)


def delete_cluster(deploy, cluster_id):
    log_info("Deleting the cluster({}).".format(cluster_id))
    deploy.delete('/clusters/{}'.format(cluster_id), True)
    pass


def log_info(msg):
    logging.getLogger('deploy').info(msg)


def configure_logging():
    FORMAT = '%(asctime)-15s:%(levelname)s:%(name)s: %(message)s'
    logging.basicConfig(level=logging.INFO, format=FORMAT)
    logging.getLogger('requests.packages.urllib3.connectionpool').
setLevel(logging.WARNING)


def main(args):
    configure_logging()
    deploy = DeployRequests(args.deploy, args.password)

    with open(args.config_file) as json_data:
        config = json.load(json_data)

        cluster_id = find_cluster(deploy, config['cluster']['name'])

        log_info("Found the cluster {} with id: {}.".format(config
['cluster']['name'], cluster_id))

        offline_cluster(deploy, cluster_id)

        delete_cluster(deploy, cluster_id)


def parseArgs():
    parser = argparse.ArgumentParser(description='Uses the ONTAP Select
Deploy API to delete a cluster')
    parser.add_argument('-d', '--deploy', required=True, type=str, help
='Hostname or IP address of Deploy server')
```

```
    parser.add_argument('-p', '--password', required=True, type=str, help
='Admin password of Deploy server')
    parser.add_argument('-c', '--config_file', required=True, type=str,
help='Filename of the cluster json config')
    return parser.parse_args()

if __name__ == '__main__':
    args = parseArgs()
    main(args)
```

通用支持模块

所有 Python 脚本都在一个模块中使用一个通用 Python 类。

```
#!/usr/bin/env python
##-----------------------------------------------------------------------
#
# File: deploy_requests.py
#
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#
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#
##-----------------------------------------------------------------------

import json
import logging
import requests

requests.packages.urllib3.disable_warnings()

class DeployRequests(object):
    '''
    Wrapper class for requests that simplifies the ONTAP Select Deploy
    path creation and header manipulations for simpler code.
    '''
```

```
    def __init__(self, ip, admin_password):
        self.base_url = 'https://{}/api'.format(ip)
        self.auth = ('admin', admin_password)
        self.headers = {'Accept': 'application/json'}
        self.logger = logging.getLogger('deploy')

    def post(self, path, data, files=None, wait_for_job=False):
        if files:
            self.logger.debug('POST FILES:')
            response = requests.post(self.base_url + path,
                                     auth=self.auth, verify=False,
                                     files=files)
        else:
            self.logger.debug('POST DATA: %s', data)
            response = requests.post(self.base_url + path,
                                     auth=self.auth, verify=False,
                                     json=data,
                                     headers=self.headers)

        self.logger.debug('HEADERS: %s\nBODY: %s', self.filter_headers
(response), response.text)
        self.exit_on_errors(response)

        if wait_for_job and response.status_code == 202:
            self.wait_for_job(response.json())
        return response

    def patch(self, path, data, wait_for_job=False):
        self.logger.debug('PATCH DATA: %s', data)
        response = requests.patch(self.base_url + path,
                                  auth=self.auth, verify=False,
                                  json=data,
                                  headers=self.headers)
        self.logger.debug('HEADERS: %s\nBODY: %s', self.filter_headers
(response), response.text)
        self.exit_on_errors(response)

        if wait_for_job and response.status_code == 202:
            self.wait_for_job(response.json())
        return response

    def put(self, path, data, files=None, wait_for_job=False):
        if files:
            print('PUT FILES: {}'.format(data))
            response = requests.put(self.base_url + path,
                                    auth=self.auth, verify=False,
```

```
                                    data=data,
                                    files=files)
        else:
            self.logger.debug('PUT DATA:')
            response = requests.put(self.base_url + path,
                                    auth=self.auth, verify=False,
                                    json=data,
                                    headers=self.headers)

        self.logger.debug('HEADERS: %s\nBODY: %s', self.filter_headers
(response), response.text)
        self.exit_on_errors(response)

        if wait_for_job and response.status_code == 202:
            self.wait_for_job(response.json())
        return response

    def get(self, path):
        """ Get a resource object from the specified path """
        response = requests.get(self.base_url + path, auth=self.auth,
verify=False)
        self.logger.debug('HEADERS: %s\nBODY: %s', self.filter_headers
(response), response.text)
        self.exit_on_errors(response)
        return response

    def delete(self, path, wait_for_job=False):
        """ Delete's a resource from the specified path """
        response = requests.delete(self.base_url + path, auth=self.auth,
verify=False)
        self.logger.debug('HEADERS: %s\nBODY: %s', self.filter_headers
(response), response.text)
        self.exit_on_errors(response)

        if wait_for_job and response.status_code == 202:
            self.wait_for_job(response.json())
        return response

    def find_resource(self, path, name, value):
        ''' Returns the 'id' of the resource if it exists, otherwise None
'''
        resource = None
        response = self.get('{path}?{field}={value}'.format(
                            path=path, field=name, value=value))
        if response.status_code == 200 and response.json().get
('num_records') >= 1:
```

```
            resource = response.json().get('records')[0].get('id')
        return resource

    def get_num_records(self, path, query=None):
        ''' Returns the number of records found in a container, or None on
error '''
        resource = None
        query_opt = '?{}'.format(query) if query else ''
        response = self.get('{path}{query}'.format(path=path, query
=query_opt))
        if response.status_code == 200 :
            return response.json().get('num_records')
        return None

    def resource_exists(self, path, name, value):
        return self.find_resource(path, name, value) is not None

    def wait_for_job(self, response, poll_timeout=120):
        last_modified = response['job']['last_modified']
        job_id = response['job']['id']

        self.logger.info('Event: ' + response['job']['message'])

        while True:
            response = self.get('/jobs/{}?fields=state,message&'
                                'poll_timeout={}&last_modified=>={}'
.format(
                                    job_id, poll_timeout, last_modified))

            job_body = response.json().get('record', {})

            # Show interesting message updates
            message = job_body.get('message', '')
            self.logger.info('Event: ' + message)

            # Refresh the last modified time for the poll loop
            last_modified = job_body.get('last_modified')

            # Look for the final states
            state = job_body.get('state', 'unknown')
            if state in ['success', 'failure']:
                if state == 'failure':
                    self.logger.error('FAILED background job.\nJOB: %s',
job_body)
                    exit(1)    # End the script if a failure occurs
                break
```

```
    def exit_on_errors(self, response):
        if response.status_code >= 400:
            self.logger.error('FAILED request to URL: %s\nHEADERS: %s
\nRESPONSE BODY: %s',
                              response.request.url,
                              self.filter_headers(response),
                              response.text)
        response.raise_for_status()   # Displays the response error, and
exits the script

    @staticmethod
    def filter_headers(response):
        ''' Returns a filtered set of the response headers '''
        return {key: response.headers[key] for key in ['Location',
'request-id'] if key in response.headers}
```

用于调整集群节点大小的脚本

您可以使用以下脚本调整 ONTAP Select 集群中节点的大小。

```
#!/usr/bin/env python
##------------------------------------------------------------------------
#
# File: resize_nodes.py
#
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#
##------------------------------------------------------------------------

import argparse
import logging
import sys

from deploy_requests import DeployRequests
```

```
def _parse_args():
    """ Parses the arguments provided on the command line when executing
this
        script and returns the resulting namespace. If all required
arguments
        are not provided, an error message indicating the mismatch is
printed and
        the script will exit.
    """

    parser = argparse.ArgumentParser(description=(
        'Uses the ONTAP Select Deploy API to resize the nodes in the
cluster.'
        ' For example, you might have a small (4 CPU, 16GB RAM per node) 2
node'
        ' cluster and wish to resize the cluster to medium (8 CPU, 64GB
RAM per'
        ' node). This script will take in the cluster details and then
perform'
        ' the operation and wait for it to complete.'
    ))
    parser.add_argument('--deploy', required=True, help=(
        'Hostname or IP of the ONTAP Select Deploy VM.'
    ))
    parser.add_argument('--deploy-password', required=True, help=(
        'The password for the ONTAP Select Deploy admin user.'
    ))
    parser.add_argument('--cluster', required=True, help=(
        'Hostname or IP of the cluster management interface.'
    ))
    parser.add_argument('--instance-type', required=True, help=(
        'The desired instance size of the nodes after the operation is
complete.'
    ))
    parser.add_argument('--ontap-password', required=True, help=(
        'The password for the ONTAP administrative user account.'
    ))
    parser.add_argument('--ontap-username', default='admin', help=(
        'The username for the ONTAP administrative user account. Default:
admin.'
    ))
    parser.add_argument('--nodes', nargs='+', metavar='NODE_NAME', help=(
        'A space separated list of node names for which the resize
operation'
        ' should be performed. The default is to apply the resize to all
```

```
nodes in'
        ' the cluster. If a list of nodes is provided, it must be provided
in HA'
        ' pairs. That is, in a 4 node cluster, nodes 1 and 2 (partners)
must be'
        ' resized in the same operation.'
    ))
    return parser.parse_args()


def _get_cluster(deploy, parsed_args):
    """ Locate the cluster using the arguments provided """

    cluster_id = deploy.find_resource('/clusters', 'ip', parsed_args
.cluster)
    if not cluster_id:
        return None
    return deploy.get('/clusters/%s?fields=nodes' % cluster_id).json
()['record']


def _get_request_body(parsed_args, cluster):
    """ Build the request body """

    changes = {'admin_password': parsed_args.ontap_password}

    # if provided, use the list of nodes given, else use all the nodes in
the cluster
    nodes = [node for node in cluster['nodes']]
    if parsed_args.nodes:
        nodes = [node for node in nodes if node['name'] in parsed_args
.nodes]

    changes['nodes'] = [
        {'instance_type': parsed_args.instance_type, 'id': node['id']} for
node in nodes]

    return changes


def main():
    """ Set up the resize operation by gathering the necessary data and
then send
        the request to the ONTAP Select Deploy server.
    """

    logging.basicConfig(
```

```
        format='[%(asctime)s] [%(levelname)5s] %(message)s', level=
logging.INFO,)

    logging.getLogger('requests.packages.urllib3').setLevel(logging
.WARNING)

    parsed_args = _parse_args()
    deploy = DeployRequests(parsed_args.deploy, parsed_args
.deploy_password)

    cluster = _get_cluster(deploy, parsed_args)
    if not cluster:
        deploy.logger.error(
            'Unable to find a cluster with a management IP of %s' %
parsed_args.cluster)
        return 1

    changes = _get_request_body(parsed_args, cluster)
    deploy.patch('/clusters/%s' % cluster['id'], changes, wait_for_job
=True)

if __name__ == '__main__':
    sys.exit(main())
```

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