# Script to create a cluster

## ONTAP Select

NetApp
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You can use the following script to create a cluster based on parameters defined within the script and a JSON input file.

```
#!/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']))
```

```
36          data = {k: vcenter[k] for k in ['hostname', 'username',
    'password']}
37          data['type'] = "vcenter"
38          deploy.post('/security/credentials', data)
39
40
41  def add_standalone_host_credentials(deploy, config):
42      """ Add credentials for standalone hosts if present in the config.
43          Does nothing if the host credential already exists on the
    Deploy.
44      """
45      log_debug_trace()
46
47      hosts = config.get('hosts', [])
48      for host in hosts:
49          # The presense of the 'password' will be used only for
    standalone hosts.
50          # If this host is managed by a vcenter, it should not have a
    host 'password' in the json.
51          if 'password' in host and not deploy.resource_exists
    ('/security/credentials',
52
    'hostname', host['name']):
53              log_info("Registering host {} credentials".format(host
    ['name']))
54              data = {'hostname': host['name'], 'type': 'host',
55                      'username': host['username'], 'password': host
    ['password']}
56              deploy.post('/security/credentials', data)
57
58
59  def register_unkown_hosts(deploy, config):
60      ''' Registers all hosts with the deploy server.
61          The host details are read from the cluster config json file.
62
63          This method will skip any hosts that are already registered.
64          This method will exit the script if no hosts are found in the
    config.
65      '''
66      log_debug_trace()
67
68      data = {"hosts": []}
69      if 'hosts' not in config or not config['hosts']:
70          log_and_exit("The cluster config requires at least 1 entry in
    the 'hosts' list got {}".format(config))
71
```

```
    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'])
```

```
111
112         log_info("Cluster properties: {}".format(data))
113
114         resp = deploy.post('/v3/clusters?node_count={}'.format
    (num_nodes), data)
115         cluster_id = resp.headers.get('Location').split('/')[-1]
116
117     return cluster_id
118
119
120 def get_node_ids(deploy, cluster_id):
121     ''' Get the the ids of the nodes in a cluster. Returns a list of
    node_ids.'''
122     log_debug_trace()
123
124     response = deploy.get('/clusters/{}/nodes'.format(cluster_id))
125     node_ids = [node['id'] for node in response.json().get('records')]
126     return node_ids
127
128
129 def add_node_attributes(deploy, cluster_id, node_id, node):
130     ''' Set all the needed properties on a node '''
131     log_debug_trace()
132
133     log_info("Adding node '{}' properties".format(node_id))
134
135     data = {k: node[k] for k in ['ip', 'serial_number',
    'instance_type',
136                                  'is_storage_efficiency_enabled'] if k
    in node}
137     # Optional: Set a serial_number
138     if 'license' in node:
139         data['license'] = {'id': node['license']}
140
141     # Assign the host
142     host_id = deploy.find_resource('/hosts', 'name', node[
    'host_name'])
143     if not host_id:
144         log_and_exit("Host names must match in the 'hosts' array, and
    the nodes.host_name property")
145
146     data['host'] = {'id': host_id}
147
148     # Set the correct raid_type
149     is_hw_raid = not node['storage'].get('disks')  # The presence of a
    list of disks indicates sw_raid
```

```
150     data['passthrough_disks'] = not is_hw_raid
151
152     # Optionally set a custom node name
153     if 'name' in node:
154         data['name'] = node['name']
155
156     log_info("Node properties: {}".format(data))
157     deploy.patch('/clusters/{}/nodes/{}'.format(cluster_id, node_id),
    data)
158
159
160 def add_node_networks(deploy, cluster_id, node_id, node):
161     ''' Set the network information for a node '''
162     log_debug_trace()
163
164     log_info("Adding node '{}' network properties".format(node_id))
165
166     num_nodes = deploy.get_num_records('/clusters/{}/nodes'.format
    (cluster_id))
167
168     for network in node['networks']:
169
170         # single node clusters do not use the 'internal' network
171         if num_nodes == 1 and network['purpose'] == 'internal':
172             continue
173
174         # Deduce the network id given the purpose for each entry
175         network_id = deploy.find_resource
    ('/clusters/{}/nodes/{}/networks'.format(cluster_id, node_id),
176                                              'purpose', network[
    'purpose'])
177         data = {"name": network['name']}
178         if 'vlan' in network and network['vlan']:
179             data['vlan_id'] = network['vlan']
180
181         deploy.patch('/clusters/{}/nodes/{}/networks/{}'.format
    (cluster_id, node_id, network_id), data)
182
183
184 def add_node_storage(deploy, cluster_id, node_id, node):
185     ''' Set all the storage information on a node '''
186     log_debug_trace()
187
188     log_info("Adding node '{}' storage properties".format(node_id))
189     log_info("Node storage: {}".format(node['storage']['pools']))
190
```

```
    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]
```

```
231     logging.getLogger('deploy').debug('Calling %s()' %
    parent_function)
232
233
234 def log_info(msg):
235     logging.getLogger('deploy').info(msg)
236
237
238 def log_and_exit(msg):
239     logging.getLogger('deploy').error(msg)
240     exit(1)
241
242
243 def configure_logging(verbose):
244     FORMAT = '%(asctime)-15s:%(levelname)s:%(name)s: %(message)s'
245     if verbose:
246         logging.basicConfig(level=logging.DEBUG, format=FORMAT)
247     else:
248         logging.basicConfig(level=logging.INFO, format=FORMAT)
249         logging.getLogger('requests.packages.urllib3.connectionpool'
    ).setLevel(
250             logging.WARNING)
251
252
253 def main(args):
254     configure_logging(args.verbose)
255     deploy = DeployRequests(args.deploy, args.password)
256
257     with open(args.config_file) as json_data:
258         config = json.load(json_data)
259
260         add_vcenter_credentials(deploy, config)
261
262         add_standalone_host_credentials(deploy, config)
263
264         register_unkown_hosts(deploy, config)
265
266         cluster_id = create_cluster_config(deploy, config)
267
268         deploy_cluster(deploy, cluster_id, config)
269
270
271 def parseArgs():
272     parser = argparse.ArgumentParser(description='Uses the ONTAP
    Select Deploy API to construct and deploy a cluster.')
273     parser.add_argument('-d', '--deploy', help='Hostname or IP address
```

```
    of Deploy server')
274     parser.add_argument('-p', '--password', help='Admin password of
Deploy server')
275     parser.add_argument('-c', '--config_file', help='Filename of the
cluster config')
276     parser.add_argument('-v', '--verbose', help='Display extra
debugging messages for seeing exact API calls and responses',
277                         action='store_true', default=False)
278     return parser.parse_args()
279
280 if __name__ == '__main__':
281     args = parseArgs()
282     main(args)
```