A step closer to realizing the true vision of Storage Infrastructure as Code

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What to expect

1) Brief Introduction to Infrastructure as Code
2) Enablers for Storage Infrastructure as Code
3) Infrastructure as Code in Action
4) Challenges and possible solutions for IAC
Infrastructure as Code

What and why
Infrastructure as Code (IaC)

What, why?

- **Infrastructure management using code and software development techniques**
  - Manage infrastructure via source control
  - Apply testing to infrastructure
  - Avoid written documentation of infrastructure
  - Enable collaboration

- **Demand for dynamic infrastructure**
  - quickly build, update and destroy

- **Accelerate DevOps**
  - The new Buyer
  - App specific request
Storage Infrastructure as Code

- Storage: D last piece in stack to be software defined
- Storage integration complex - Admin control
- Storage platforms sophisticated
Realize Storage Infrastructure With APIs

How and why
Evolution

Automation has evolved from shell and bash scripts, to infrastructure definitions

- Need for modern interface to integrate with any:
  - Orchestration tool
  - Configuration management tool
  - North bound tool

- Need for interface:
  - Easy to integrate
  - Standardization
RESTful APIs

why

- Open API specification: Industry standard rest APIs
- Aligns well with modern Devops practices: security, dev, minimal learning curve.

Benefits:
- Formal definition of data models and consumption of storage objects remains standard across platforms
- Consumption simplicity
Infrastructure as code in action

How
LAMP stack
Spin up Compute, Network and Storage

- Development use case: Setup LAMP stack for web development
  - Linux
  - Apache
  - MySQL
  - Python/Perl

Linux VM
Provision Infrastructure as Code

Ex Orchestrator/CMP tool

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Playbook: Provision LAMP Stack

1. Task: Create Vm -> Virtulation Module
2. Task: Up Network -> Networok module
3. Task: Provision Storage -> Storage module
   4. Bring up applications
Playbook to Provision NFS Share

1. Task: Provision File share
   FileShareModule:
   - host: 10.195.50.132
   - port: 8443
   - user: admin
   - password: Netapp!
   - action: post
   - name: ansibleFileShare
   - size: 204803008
   - storage_vm_key: "{{ jsonResultForSVI }}" 
   - storage_service_level_key: "{{ jsonResultForServiceLevel }}"
   - register: jsonResult
   - name: print the job key
   - debug: msg="{{ jsonResult.meta.result.record[0].key }}"

2. Task: Find Export Policy
   ExportPolicyModule:
   - host: 10.195.50.132
   - port: 8443
   - user: admin
   - password: Netapp!
   - action: get
   - name: ansibleExportPolicy
   - register: jsonResult
   - name: print the file share key
   - debug: msg="{{ jsonResultForFileShare.meta.result.records[0].key }}"

3. Task: Provision NFS share
   NFSShareModule:
   - host: 10.195.50.132
   - port: 8443
   - user: admin
   - password: Netapp!
   - action: post
   - export_policy_key: "{{ jsonResultForExportPolicy.meta.result.records[0].key }}"
   - file_share_key: "{{ jsonResultForFileShare.meta.result.records[0].key }}"
   - register: jsonResult
   - name: print the job key
   - debug: msg="{{ jsonResult.meta.result.records[0].key }}"
Playbook to Provision Storage and Mount Same @host

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**4. Task:** Provision 2 NFS share

**1. Task:** Start NFS service

**3. Task:** Mount NFS Share @host

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```shell
name: shell execution
action:
  module: vmware_vm_shell
  hostname: 10.193.81.15
  username: "administrator@vsphere.local"
  password: "netapp1!"
  datacenter: VC-openlab
  validate_certs: no
  vm_id: "{{ inventory_hostname }}"
  vm_username: root
  vm_password: "netapp1!"
  vm_shell: /usr/bin/service
  vm_shell_args: " nfs start "
  vm_shell_env:
    - "VAR=/var"
    - "VAR=var"
  vm_shell_cwd: "/tmp"

tasks:
- name: shell execution
  action:
    module: vmware_vm_shell
    hostname: 10.193.81.15
    username: "administrator@vsphere.local"
    password: "netapp1!"
    datacenter: VC-openlab
    validate_certs: no
    vm_id: "{{ inventory_hostname }}"
    vm_username: root
    vm_password: "netapp1!"
    vm_shell: /usr/bin/mount
    vm_shell_args: " -t nfs 10.193.81.16:/nasableFileShare:/NFSmnt -o nfsvers=3 > /tmp/mounted"
    vm_shell_env:
      - "VAR=/var/bin"
      - "VAR=var"
    vm_shell_cwd: "/tmp"
```
Quickly provision LAMP Stack: Demo

Provision storage for application with APIs
Ansible with APIs Integration

API Gateway

RESTful APIs

Storage Modules for NFS share

Storage Modules for LUN

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Infrastructure as Code: Production Use case

- Scaled Setup

Dev

Prod

Test

MySQL

Apache

Apache

Apache

Apache
Challenges and Solutions
## What’s required

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Possible solution</th>
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<tbody>
<tr>
<td>Less control to Storage Admin</td>
<td>Policies based APIs</td>
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<tr>
<td>Securing the production environment</td>
<td>Multitenancy</td>
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<tr>
<td>Poor resource Utilization</td>
<td>Define resource consumption Limits(QoS)</td>
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<tr>
<td>Need to meet SLA</td>
<td>Service catalogue and</td>
</tr>
</tbody>
</table>
Find out how to offer Storage as a Service!
https://devnet.netapp.com/nsIm

U can also write to me @ pmunshi@netapp.com