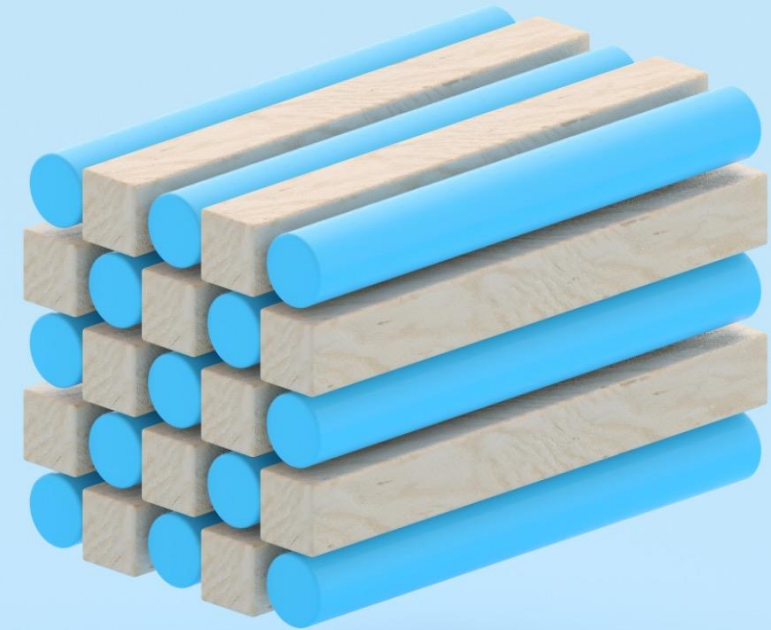


Proprietäre Workflows zu offenem Code

Der IaC Transformationsakt



Adrian Bronder
Global Solutions Architect
18. Mai, 2021



Data Driven

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NetApp Company Overview

Helping customers lead with data

Leading data services for hybrid multi-cloud

Diversified portfolio addressing multiple market segments
Total addressable market: \$53 billion¹ and growing

Global presence serving 140+ countries, 10,000+ employees

28 years of innovation helping customers manage data
\$2.5 billion investment in continuous customer-driven innovation²

Fortune 500 Company, NASDAQ: NTAP
Founded 1992, headquarters: Sunnyvale, California

FY20 Revenue

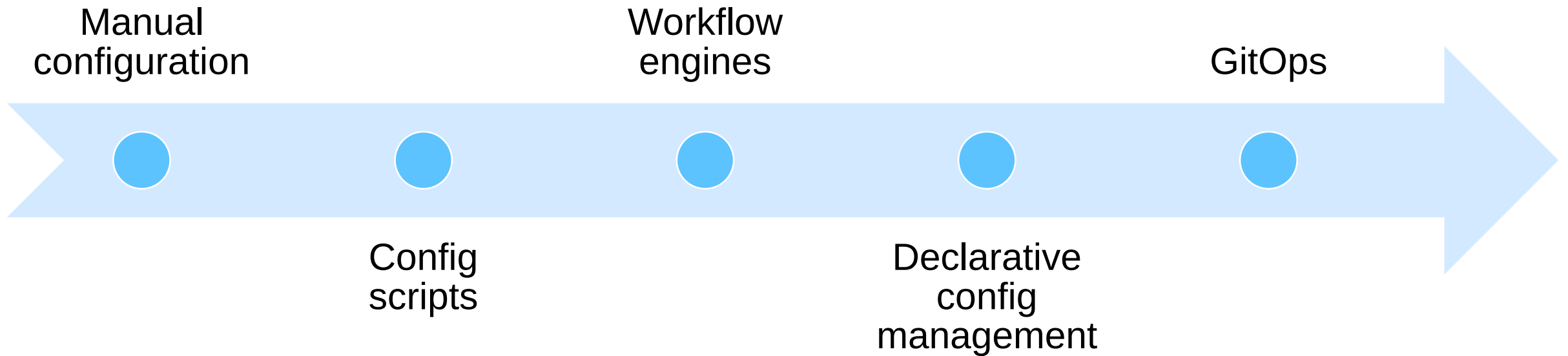
\$5.41
BILLION

¹ Worldwide and U.S. Enterprise Storage Systems Forecast, 2017–2021, IDC; Worldwide Enterprise Storage for Public and Private Cloud 2015-19; Segment Forecasts by IDC; NTAP Market Intelligence

² Over the last 3 years FY18 to FY20

The Journey to GitOps

Imperative vs. declarative



Proprietary (Storage) Automation Platform

NetApp Workflow Automation

OnCommand Workflow Automation

WORKFLOWS

All (65)

Application Provisioning (1)

Virtualization (2)

No Category (2)

Content Repository (5)

Data Protection (20)

Decommissioning (2)

Getting Started (2)

Migration (3)

Miscellaneous (1)

Setup (7)

Storage Provisioning (21)

EXECUTION

WORKFLOW DESIGN

DATA SOURCE DESIGN

CONTENT MANAGEMENT

Abort SnapMirror relationship

Controller and shelf upgrade of an HA pair

Create SnapMirror then SnapMirror cascade

Create Volume on Array Filtered Using its Performance Characteristics

Create a Qtree CIFS Share in a vFiler

Add or expand capacity storage class to Infinite Volume

Create Basic Storage Virtual Machine And Delegate To 'domain' User

Create SnapMirror SnapVault cascade

Create a Clustered ONTAP NFS Volume

Create a Qtree and an NFS Export

Execute Workflow 'SMB File Access'

User Inputs

Cluster Name* cluster2

Select an Existing Storage Virtua... svm5

Aggregate Details

Select an Existing Aggregate*
Do you want to create a new aggre...

Name	Is CIFS Running	Allowed Protocols
svm21	Yes	cifs,nfs,iscsi
svm5	Yes	cifs,nfs

Aggregate Name *

Node Name* cluster2-01

RAID Type* raid_dp

Disk Count * 5

Volume Details

Workflow Design

Create Aggregate

Wait for aggregate o...

Create volume

Create CIFS share

Remove CIFS share AC...

Add CIFS share

aggregate

aggregate,aggregate....

volume

cifsshare

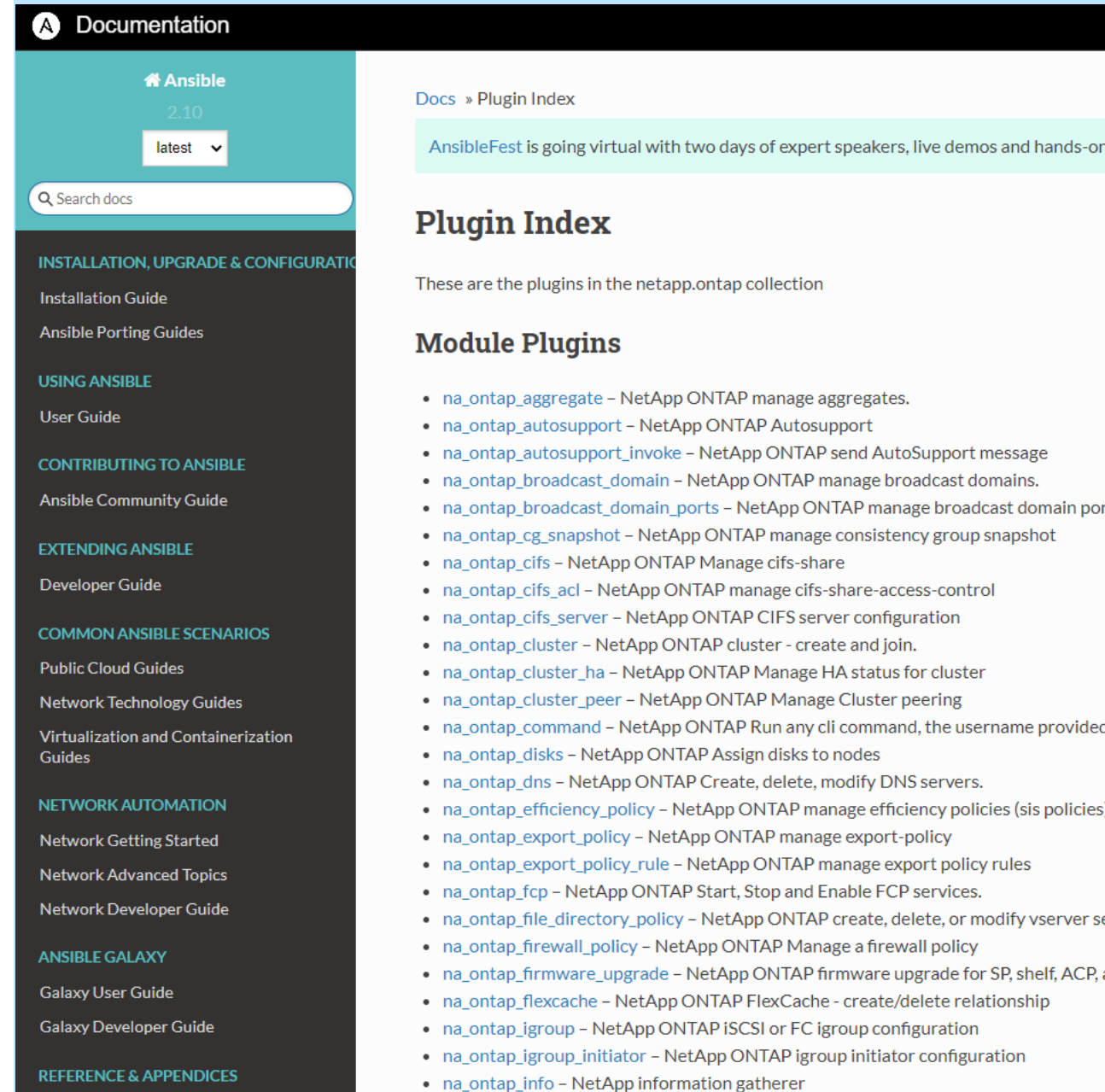
cifsshare

cifsshare

NetApp Modules for Ansible

Overview and Feature Coverage

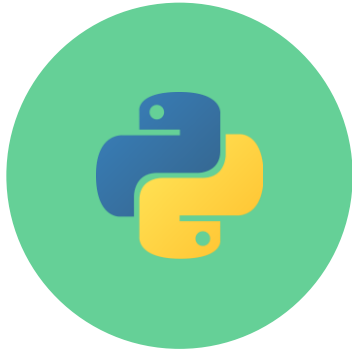
- Certified Ansible Content
- Monthly updates + hot fixes
- ZAPI to REST covered in modules
- Any command in ONTAP can be executed
- Hosted on Ansible Galaxy + available on Red Hat's Automation Hub
 - <https://galaxy.ansible.com/netapp/ontap>
- Source code on GitHub:
 - <https://github.com/ansible-collections/netapp>
- Community and support via Slack:
 - https://join.slack.com/t/netapppub/shared_invite/zt-hfjwq15x-0pVgyi4EQZfhLnh05mcgyA



The screenshot shows the NetApp Ansible Documentation website. The header includes the 'Documentation' title and a search bar. The main content area is divided into sections: 'INSTALLATION, UPGRADE & CONFIGURATION' (Installation Guide, Ansible Porting Guides), 'USING ANSIBLE' (User Guide), 'CONTRIBUTING TO ANSIBLE' (Ansible Community Guide), 'EXTENDING ANSIBLE' (Developer Guide), 'COMMON ANSIBLE SCENARIOS' (Public Cloud Guides, Network Technology Guides, Virtualization and Containerization Guides), 'NETWORK AUTOMATION' (Network Getting Started, Network Advanced Topics, Network Developer Guide), 'ANSIBLE GALAXY' (Galaxy User Guide, Galaxy Developer Guide), and 'REFERENCE & APPENDICES'. On the right, the 'Plugin Index' section is visible, stating 'These are the plugins in the netapp.ontap collection' and listing various module plugins such as `na_ontap_aggregate`, `na_ontap_autosupport`, `na_ontap_broadcast_domain`, `na_ontap_broadcast_domain_ports`, `na_ontap_cg_snapshot`, `na_ontap_cifs`, `na_ontap_cifs_acl`, `na_ontap_cifs_server`, `na_ontap_cluster`, `na_ontap_cluster_ha`, `na_ontap_cluster_peer`, `na_ontap_command`, `na_ontap_disks`, `na_ontap_dns`, `na_ontap_efficiency_policy`, `na_ontap_export_policy`, `na_ontap_export_policy_rule`, `na_ontap_fcp`, `na_ontap_file_directory_policy`, `na_ontap_firewall_policy`, `na_ontap_firmware_upgrade`, `na_ontap_flexcache`, `na_ontap_igroup`, `na_ontap_igroup_initiator`, and `na_ontap_info`.

NetApp with Ansible

Requirements

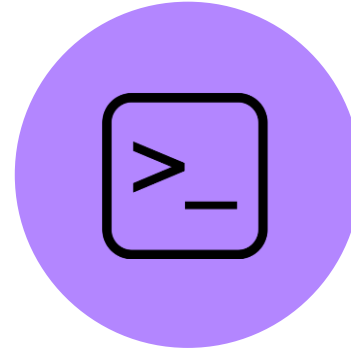


Python

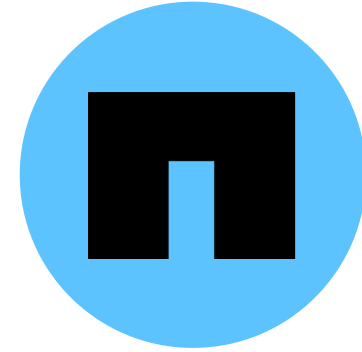
version 2.7, 3.5 or
higher



Ansible
Installation



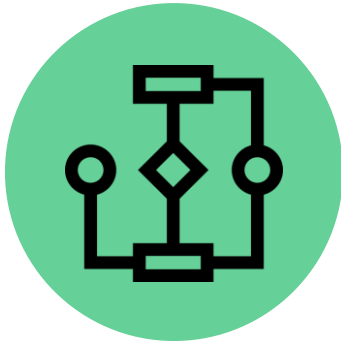
Familiarity with the
Linux shell



Optional:
NetApp library

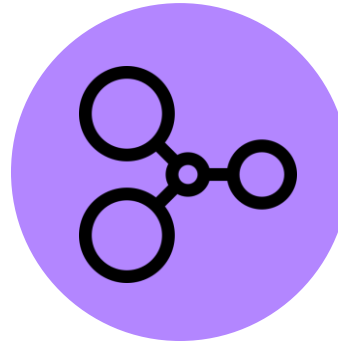
(to execute playbooks against
your ONTAP systems with
proprietary API - ZAPI)

Transformation Challenges



Process

- Open collaboration (Git, Confluence...)
- Modern automation includes test automation
- ...



People

- Mindset - Think “state” not “pseudocode”
- End-user might still want a “black-box”
- ...



Technology

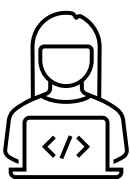
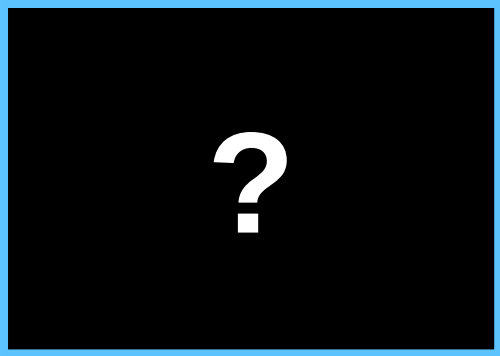
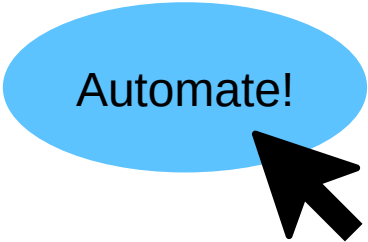
- Ansible, AWX, Tower...
- Python, YAML, REST, K8s...
- ...

Expectation Balance Act

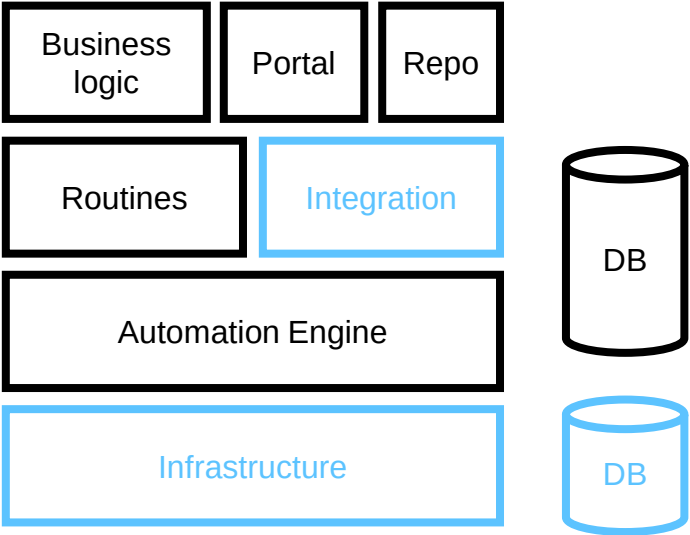
Open tool-chain vs. (or rather as?!) black-box



Give me a button!

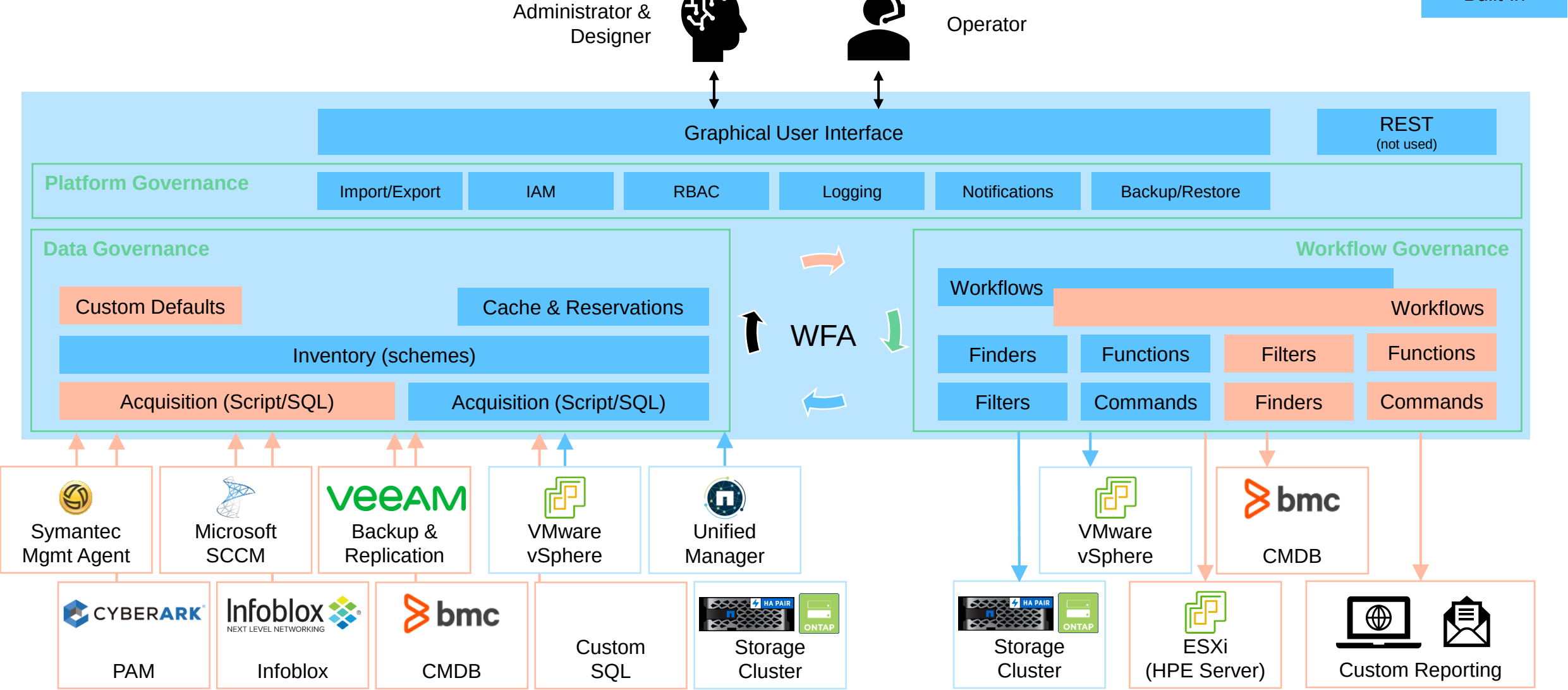


Integrate a solution!



WFA Components

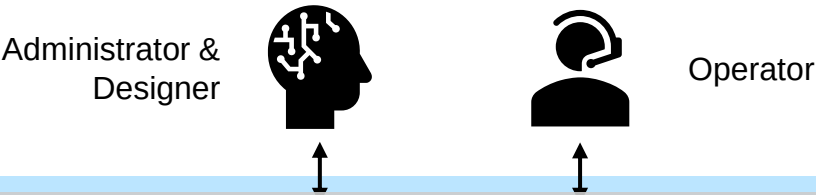
High-level Diagram



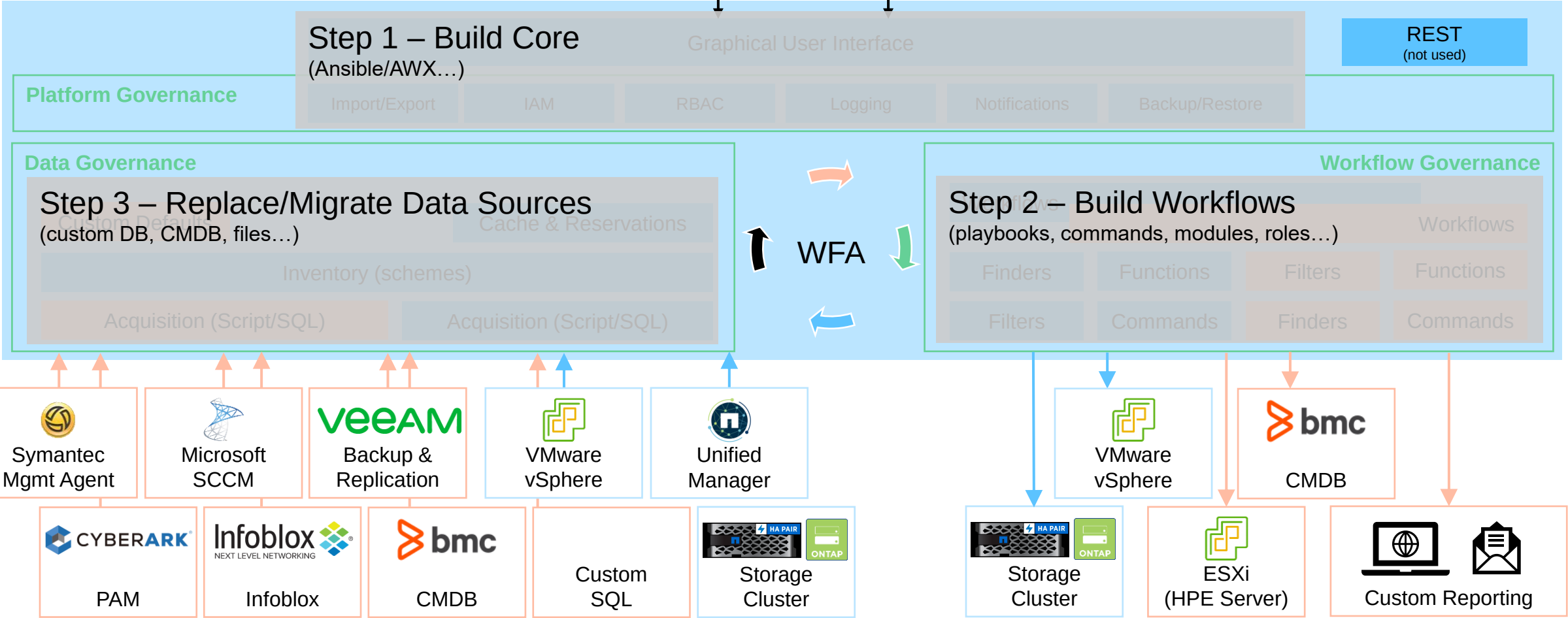
Transformation Considerations

Phased implementation

custom
Built-in

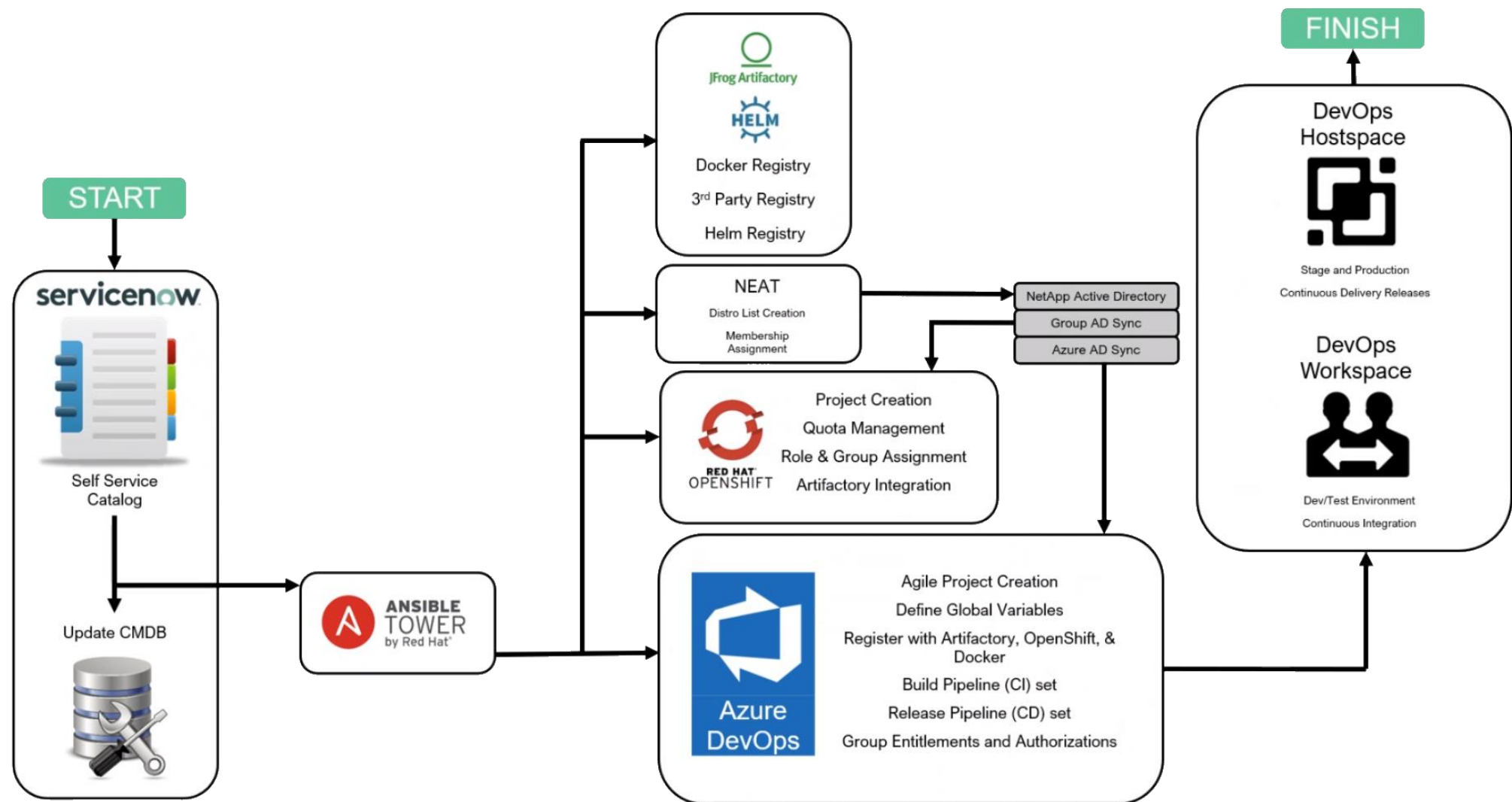


Step 1.5 – Extend Core
(Git, CI/CD, custom GUI, custom database...)



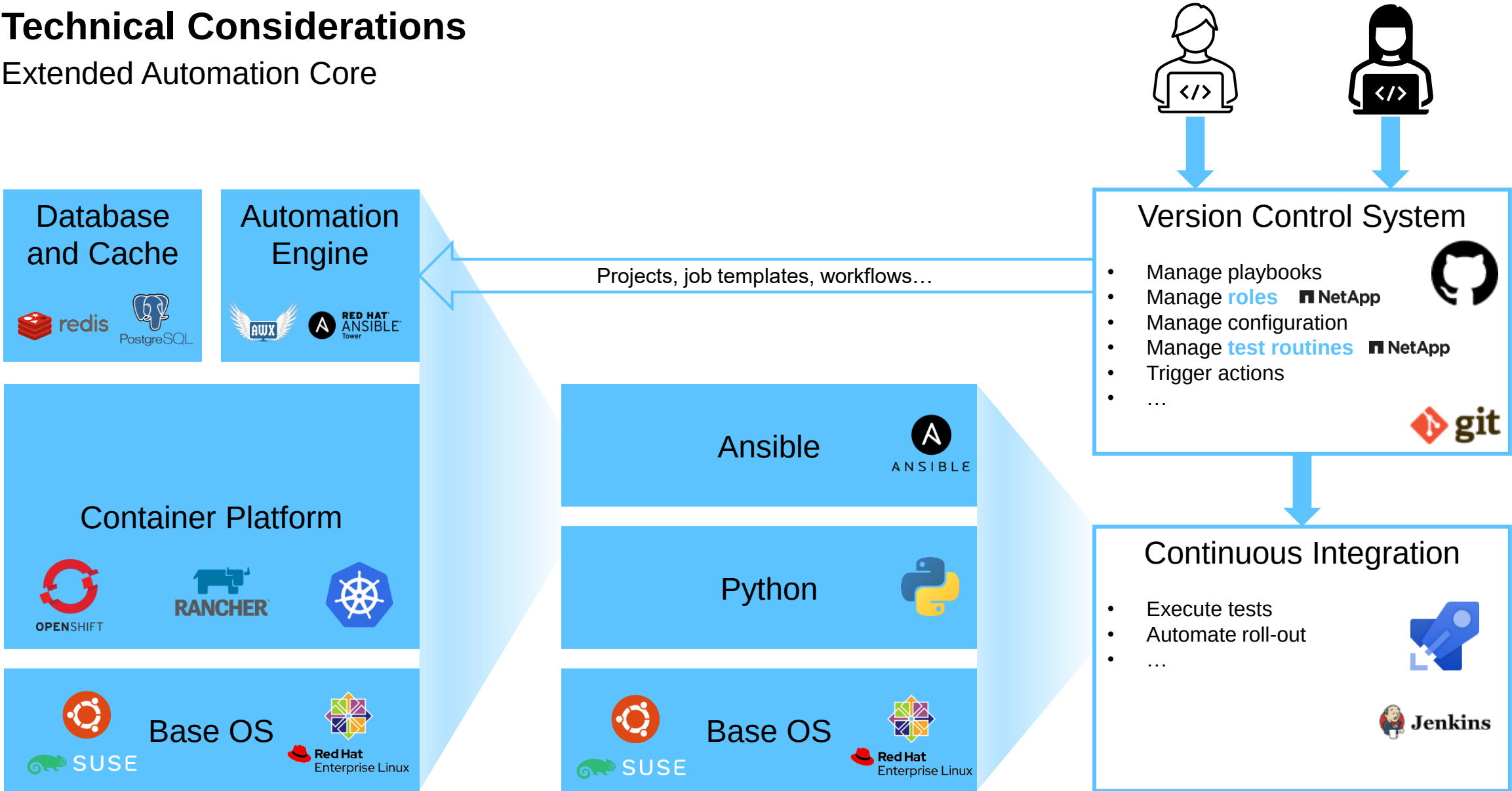
NetApp Reference Architecture

CaaS for Customer One



Technical Considerations

Extended Automation Core

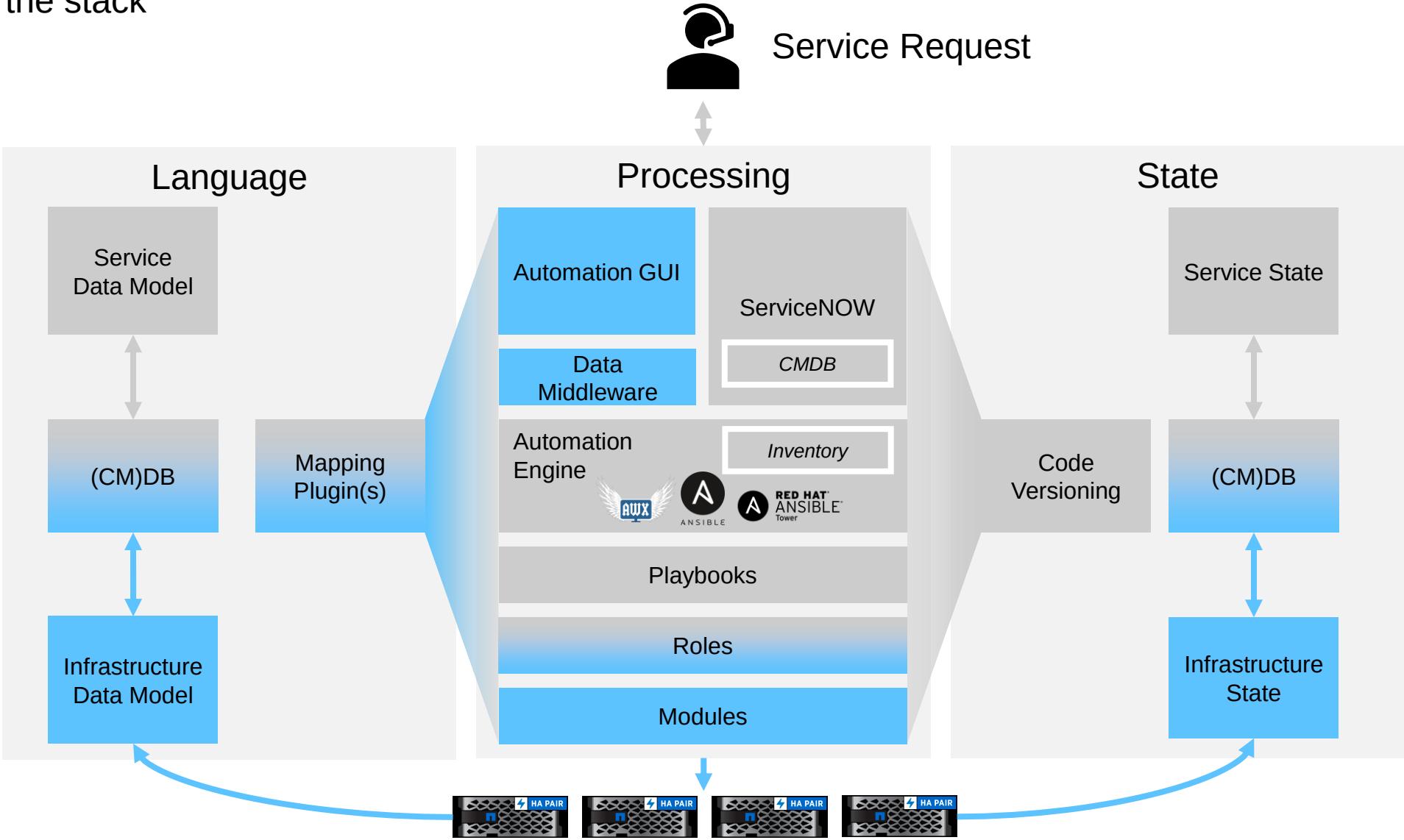


Technical Considerations

Traversing the stack

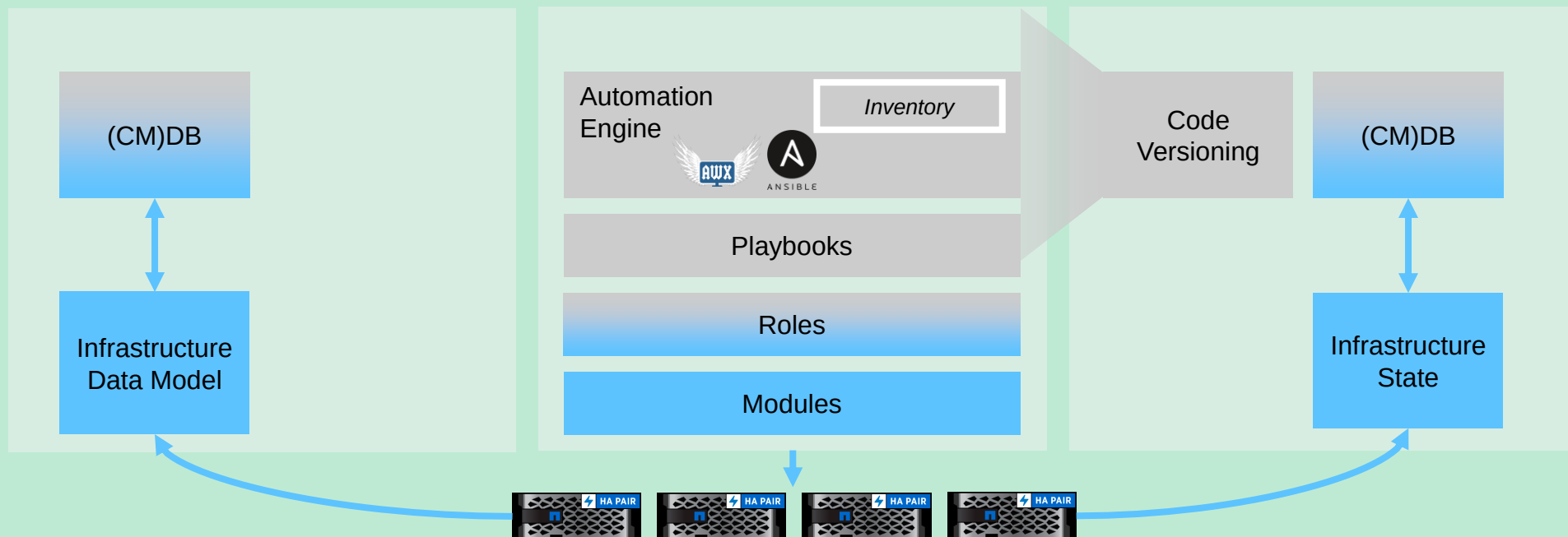
In Scope

Out of Scope





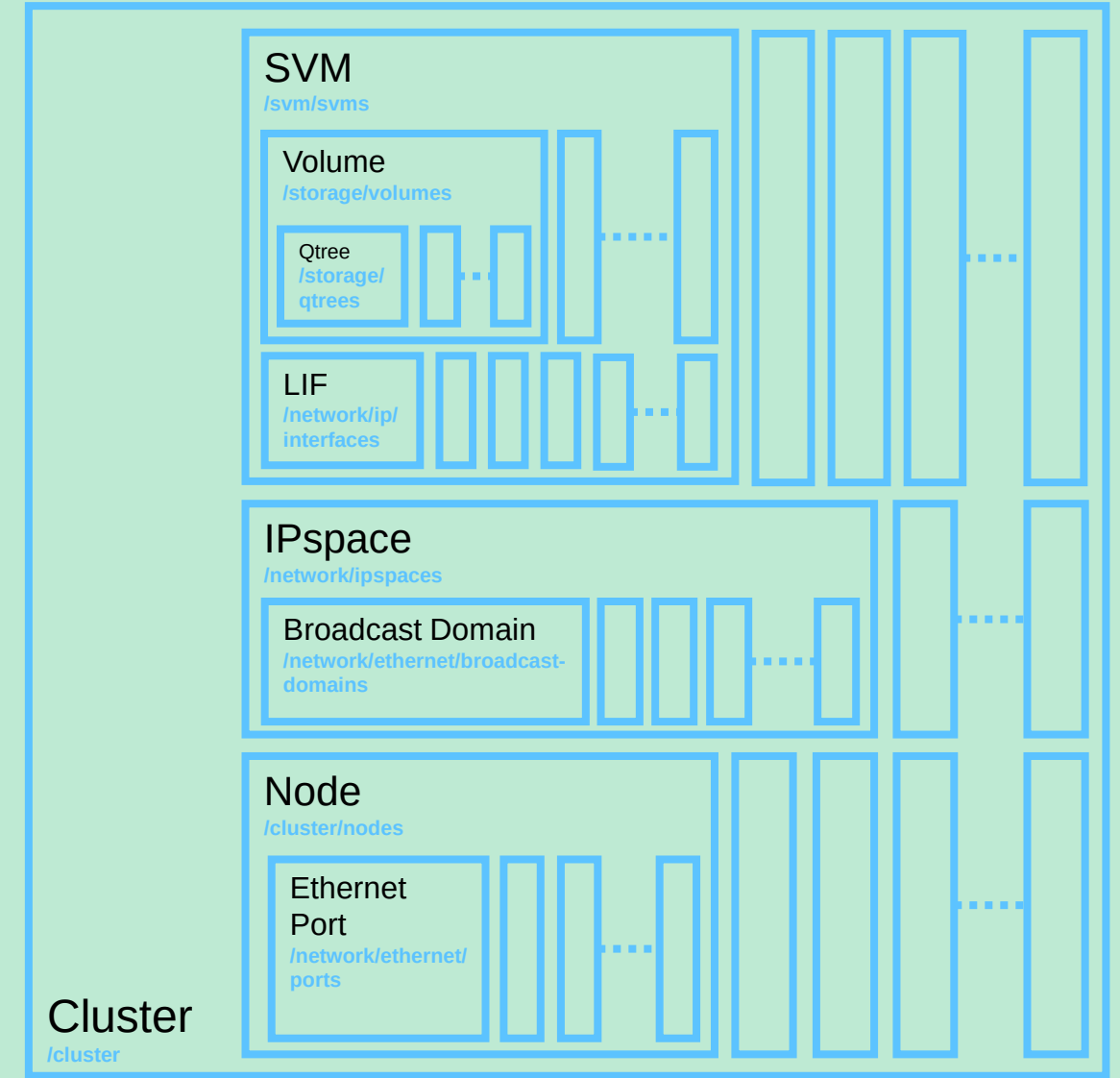
DEMO TIME!



Demo Example

Inventory – ONTAP Data Model

```
name:
location:
contact:
# ...
svms:
  - name:
    comment:
    ipspace:
      name:
      uuid:
    language:
# ...
  ip_interfaces:
    - location:
      auto_revert:
      home_node:
        name:
        uuid:
      failover:
      home_port:
        name:
        uuid:
        node:
          name:
        broadcast_domain:
          name:
          uuid:
# continued...
    ip:
      netmask:
      address:
    name:
    ipspace:
      name:
      uuid:
# ...
  volumes:
    - name:
      uuid:
      type:
      size:
      snapshot_policy:
        name:
        uuid:
# ...
  qtrees:
    - name:
      id:
      path:
      unix_permissions:
```



Demo Example

Role – Defaults
→ ONTAP SVM (Storage Virtual Machine)

DOC

/svm/svms

GET

/svm/svms

POST

/svm/svms

Creates and provisions an SVM. If no IPspace is provided, then the SVM is created on the Default IPspace.

- The number of parallel SVMs that can be created must not be greater than five.
- If a sixth SVM must be created, the following error message is reported: "Maximum allowed SVMs has been reached."

Example Value Model	
svm {	
dns	{
readCreate:	"1"
domains	dns_domains > [...]
_links	> {...}
servers	name_servers > [...]
}	
nfs	{
readCreate:	"1"
_links	> {...}
enabled	boolean Enable NFS? Setting to true creates a
}	
certificate	> {...}
_links	> {...}
uuid	string example: 02c9e252-41be-11e9-81d5-00a0986138f7 readOnly: 1 The unique identifier of the SVM.
state	string example: running readModify: 1 SVM State Enum:
	> Array [5]

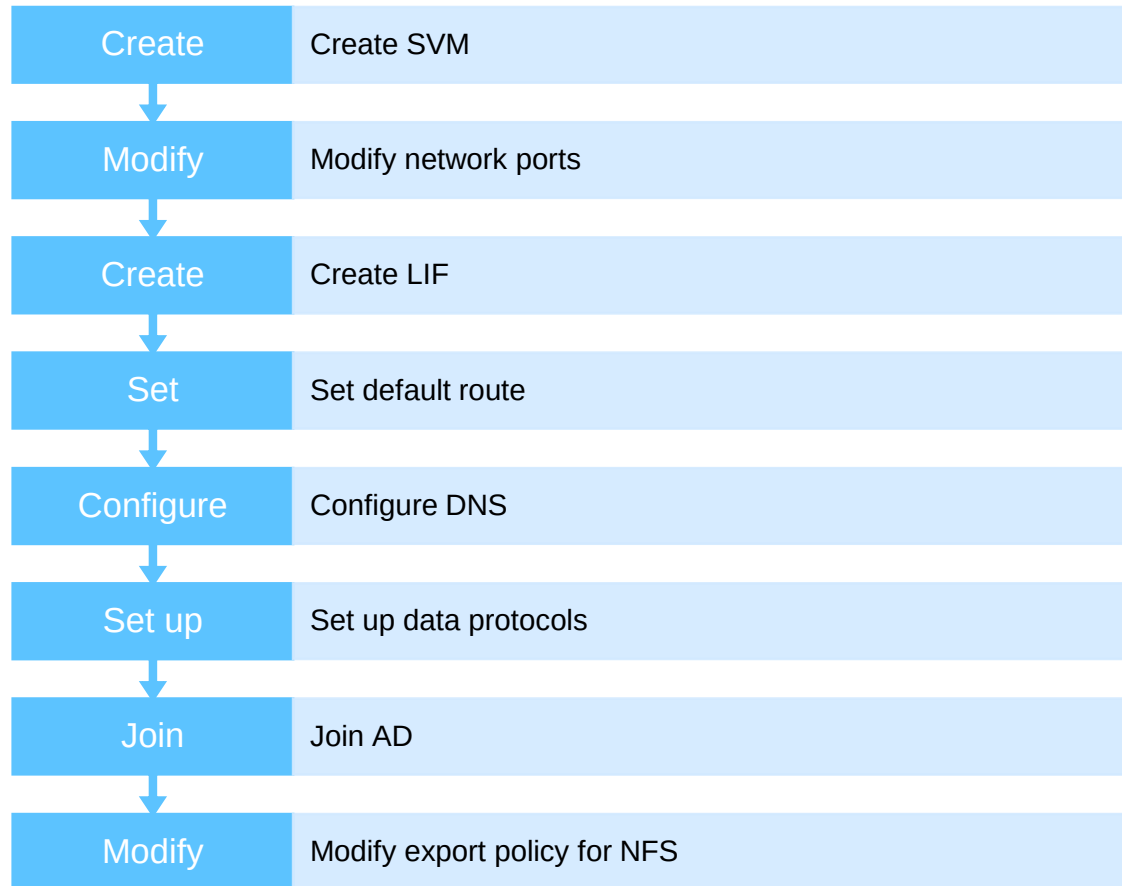
https://library.netapp.com/ecmdocs/ECMLP2862544/html/index.html#/svm/svm_create

```
---
# defaults file for ontap_svm
name:
comment:
dns:
  domains: []
  servers: []
nfs:
  enabled:
ip_interfaces:
- location:
  home_node:
    name:
    uuid:
  broadcast_domain:
    name:
    uuid:
ip:
  netmask:
  address:
  name:
  service_policy:
cifs:
  name:
  ad_domain:
  organizational_unit:
  fqdn:
  password:
  user:
  enabled:
fc_interfaces:
- data_protocol:
  location:
    port:
      name:
      uuid:
      node:
        name:
    name:
  subtype:
routes:
- gateway:
  destination:
    netmask:
    address:
nis:
  domain:
  servers: []
  enabled:
snapshot_policy:
  name:
  uuid:
ipspace:
  name:
  uuid:
nvme:
  enabled:
...
```

Demo Example

Role – Tasks

→ ONTAP SVM (Storage Virtual Machine)



```
---
# tasks file for ontap_svm
- name: Check for mandatory variables
  fail:
    msg: "You must pass the 'ontap_svm_name' variable"
  when:
    ontap_svm_name is undefined
  tags:
    - always

- name: Set Connection Details
  ansible.builtin.set_fact:
    ontap_login: &ontap_login
    hostname: "{{ ontap_hostname }}"
    username: "{{ ontap_username }}"
    password: "{{ ontap_password }}"
    https: true
    validate_certs: false
    use_rest: never
  tags:
    - always
  no_log: true

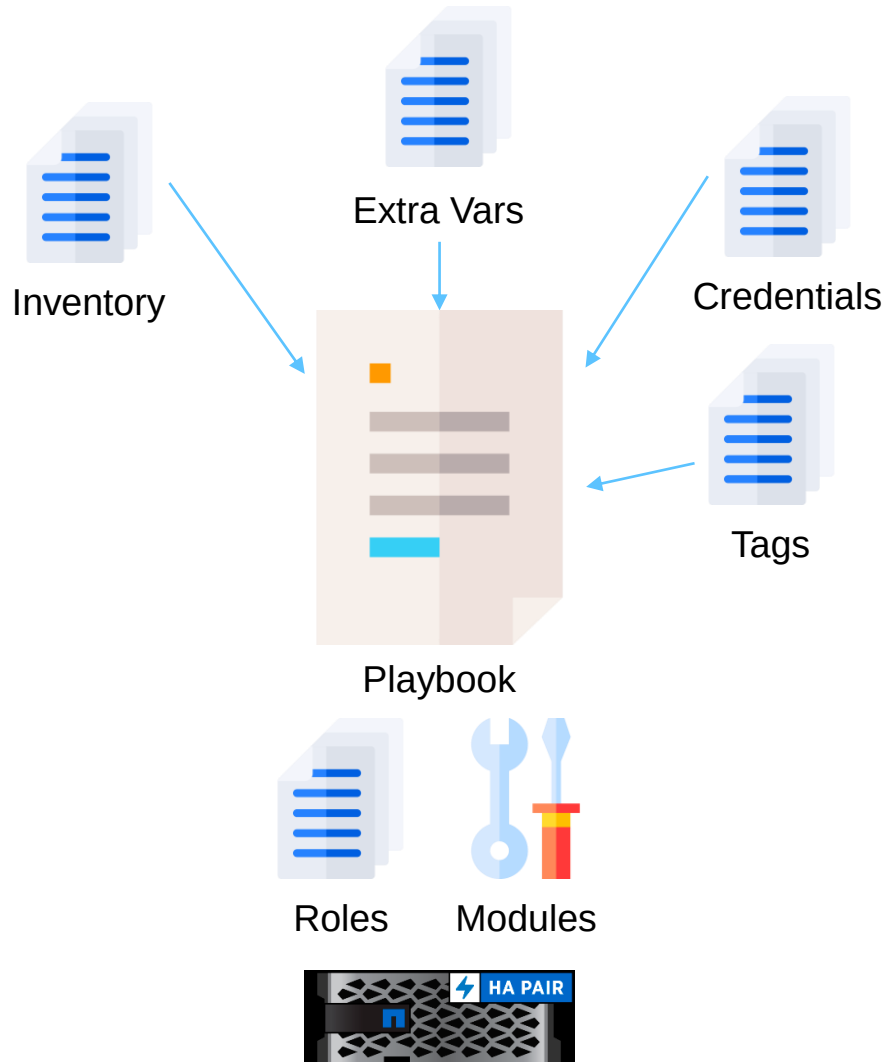
- name: Source Inventory Information
  block:
    - name: Find SVM
      ansible.builtin.set_fact:
        ontap_svm_obj: "{{ ontap_svm_obj | combine(item, recursive=True) }}"
      loop:
        "{{ svms | list }}"
      when:
        - item.name == ontap_svm_name
  tags:
    - source_inventory

- name: Create SVM
  na_ontap_svm:
    state: present
    name: "{{ ontap_svm_name }}"
    language: "{{ ontap_svm_obj.language }}"
    comment: "{{ ontap_svm_obj.comment }}"
    ipspace: "{{ ontap_svm_obj.ipspace.name }}"
    snapshot_policy: "{{ ontap_svm_obj.snapshot_policy.name }}"
    <<: *ontap_login
  tags:
    - create_ontap_svm
    - modify_ontap_svm

- name: Delete SVM
  na_ontap_svm:
    state: absent
    name: "{{ ontap_svm_name }}"
    <<: *ontap_login
  tags:
    - never
    - delete_ontap_svm
...
```

Demo Example

Execution – SVM Create



```
ansible_pilot $ cat pilot_play.yml
```

```
---
- hosts:      "{{ ontap_cluster_name }}"
  gather_facts: false

  roles:
    - role: ontap_svm
```

```
ansible_pilot $ ansible-playbook -i ontap_inventory pilot_play.yml -e
'{"ontap_cluster_name":"cluster1","ontap_username":"user","ontap_password":"pssword"}' -e
'{"ontap_svm_name":"pri_svm_01","ontap_ip_interface_name":"pri_svm_01_mgmt01"}' -t
"source_inventory,create_ontap_svm"
```

```
PLAY [cluster1] *****
```

```
TASK [ontap_svm : Check for mandatory variables] *****
skipping: [cluster1]
```

```
TASK [ontap_svm : Set Connection Details] *****
ok: [cluster1]
```

```
TASK [ontap_svm : Find SVM] *****
ok: [cluster1] => (item=[...])
```

```
TASK [ontap_svm : Create SVM] *****
changed: [cluster1]
```

```
TASK [Create Management LIF] *****
```

```
TASK [ontap_ip_interface : Check for mandatory variables] *****
skipping: [cluster1]
```

```
TASK [ontap_ip_interface : Set Connection Details] *****
ok: [cluster1]
```

```
TASK [ontap_ip_interface : Find SVM] *****
ok: [cluster1] => (item=[...])
```

```
TASK [ontap_ip_interface : Find IP Interface] *****
ok: [cluster1] => (item=[...])
```

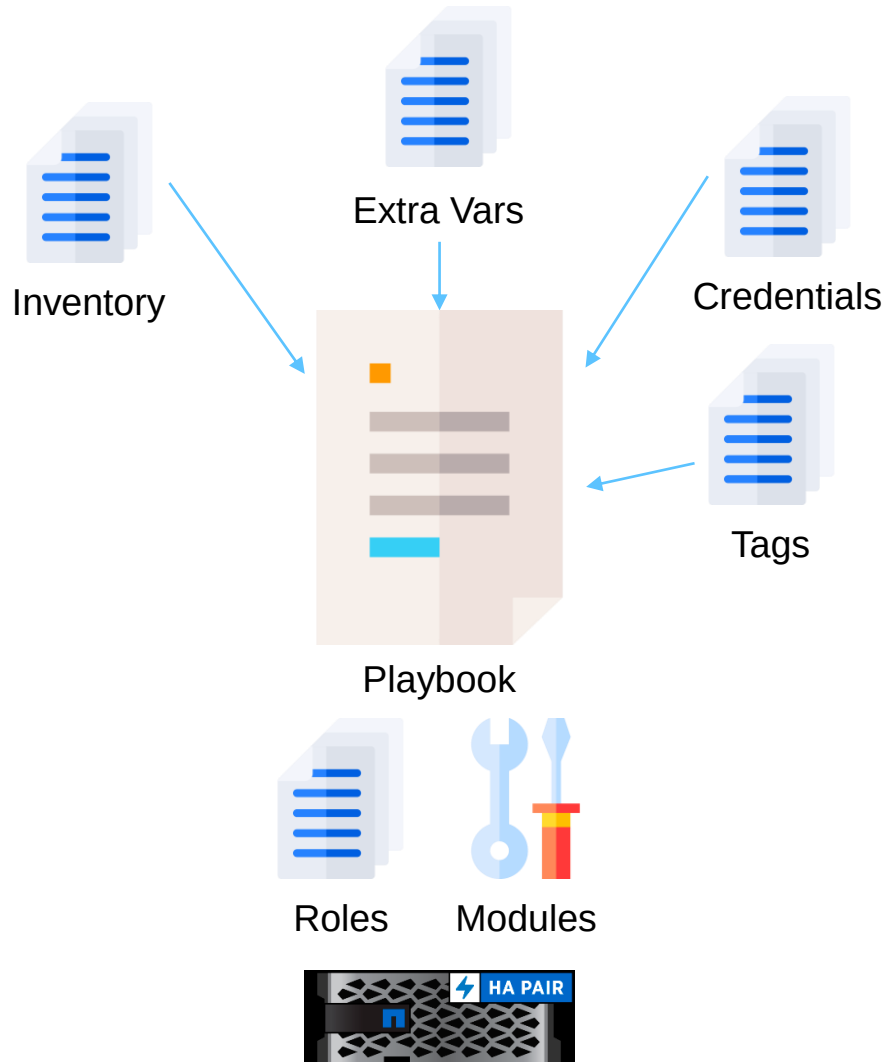
```
TASK [ontap_ip_interface : Create LIF] *****
changed: [cluster1]
```

```
TASK [ontap_svm : Configure DNS] *****
changed: [cluster1]
```

```
PLAY RECAP *****
cluster1                : ok=8    changed=3    unreachable=0    failed=0    skipped=2
rescued=0                ignored=0
```

Demo Example

Execution – SVM Delete



```
ansible_pilot $ cat pilot_play.yml
```

```
---
- hosts:      "{{ ontap_cluster_name }}"
  gather_facts: false

  roles:
  - role: ontap_svm
```

```
ansible_pilot $ ansible-playbook -i ontap_inventory pilot_play.yml -e
'{"ontap_cluster_name":"cluster1","ontap_username":"user","ontap_password":"pssword"}' -e
'{"ontap_svm_name":"pri_svm_01"}' -t "delete_ontap_svm"
```

```
PLAY [cluster1] *****
```

```
TASK [ontap_svm : Check for mandatory variables] *****
skipping: [cluster1]
```

```
TASK [ontap_svm : Set Connection Details] *****
ok: [cluster1]
```

```
TASK [ontap_svm : Delete SVM] *****
changed: [cluster1]
```

```
PLAY RECAP *****
cluster1 : ok=2  changed=1  unreachable=0  failed=0  skipped=1
rescued=0  ignored=0
```

Key Take-aways

Desired outcomes



Ansible modules are not enough!

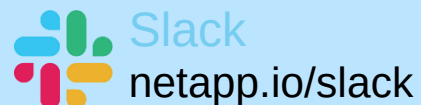


You are not done, when you are done!



Clean trumps quick!





thePub

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Stay connected...



adrian.bronder@netapp.com



<https://www.linkedin.com/in/adrianbronder/>

