Hitachi Storage Modules for Red Hat Ansible v2.2

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The Atypical Ansible Usage

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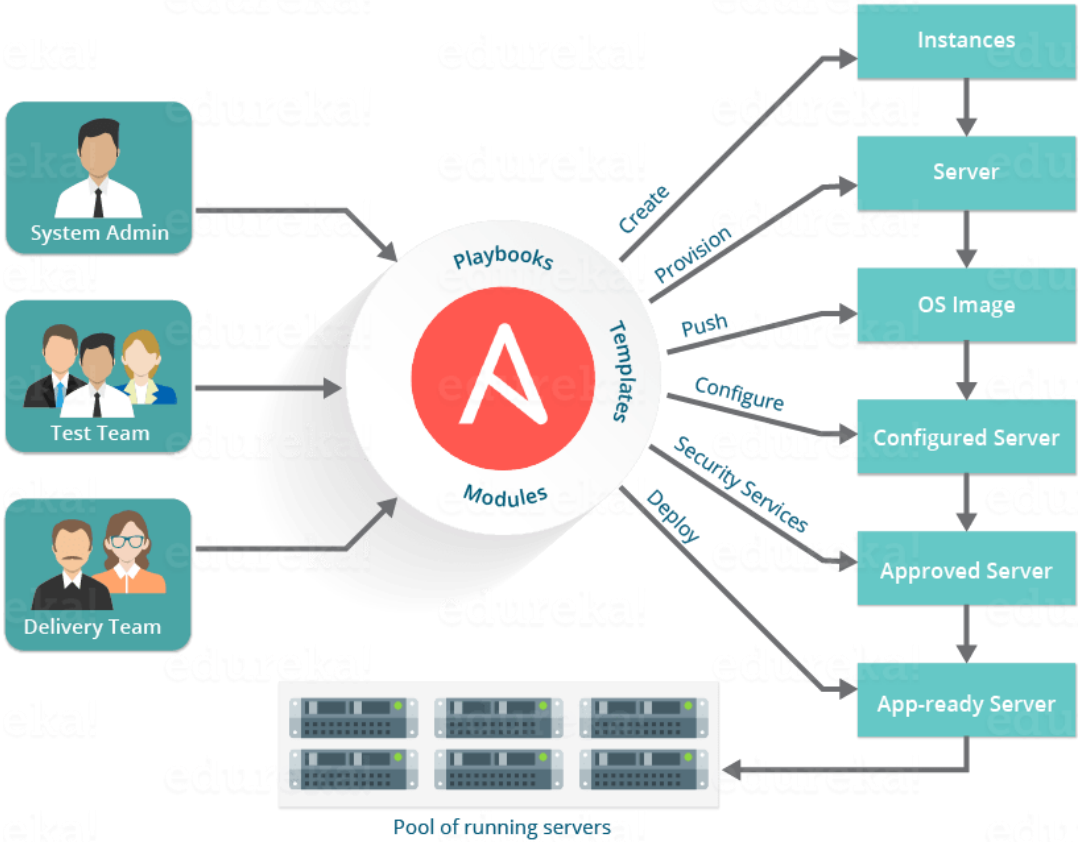

Storage anyone ?

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Ansible and Terraform
Infrastructure as Code

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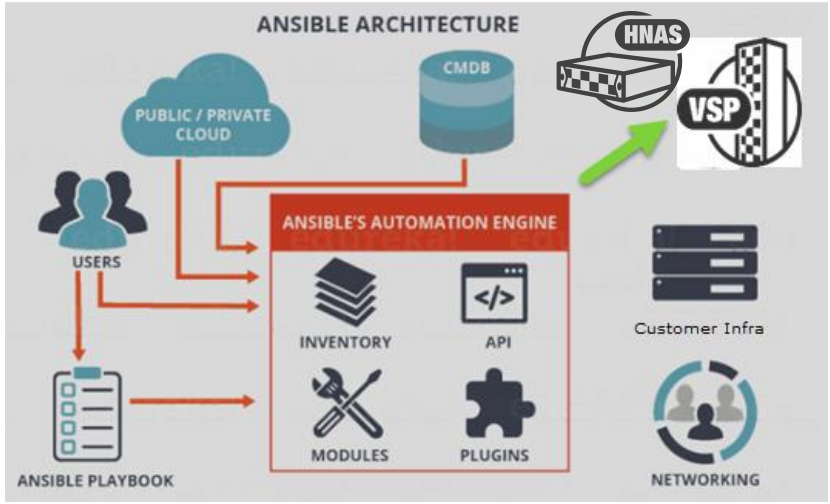

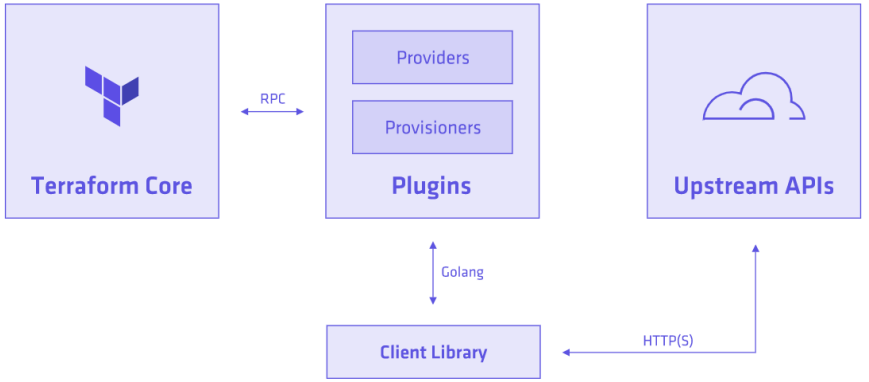

- Customer's Desired Outcome:
  - Application configuration and infrastructure automation pipeline
    - **Remove friction, go fast and reliably -** Use infrastructure as code (IAC) (declarative)
  - Include VSP storage data services as part of their DevOps / IAC initiatives for a variety of apps, database and virtualization ecosystems

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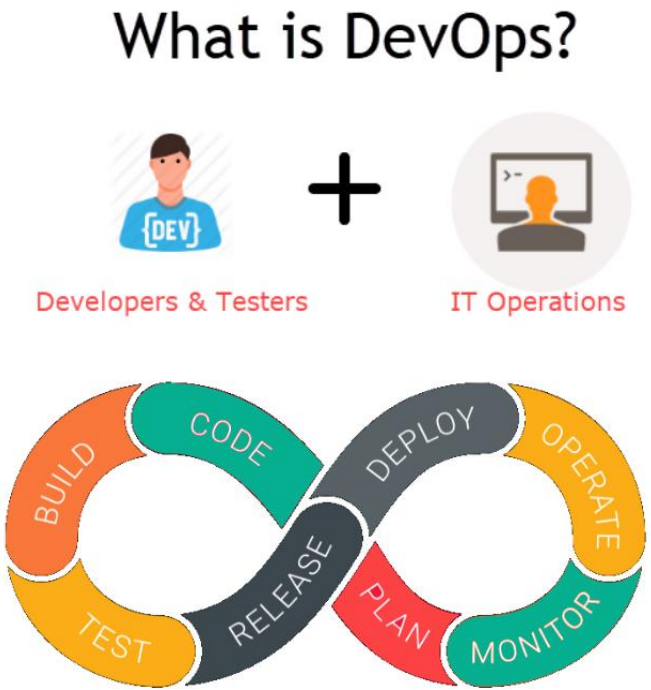
Target Audience

- Target audience is general administrators and DevOps who want a level of repeatable management automation over storage resources/services for their app services.
  - E.g. DevOps Admin need to provision storage resources to apps team for their staging environment on repeatable basis
  - Wants to give copy of prod DB to ‘test’
- Secondary Audience is traditional ops/storage admins (They just like ansible and a future proof skillset as IT teams transition to ‘cloud team/cloud ops’)



Familiar quick access to storage data services

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Ansible Integration Options with Hitachi

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Ansible Modules for VSP

- Cover key storage resources and data services
- Certified ansible collection with enterprise subscription *
- Open source community version **

Ops Center Automator

- Any service integration
- End to end drag-drop and scriptable workflows callable from Ansible
- RBAC capabilities of Ops Center Suite
- Datacenter Awareness

Automator Blueprints, Catalogs and Ansible

- Calling ansible playbooks as one component of a larger end to end “deployment as a service”

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Ansible Modules & Playbooks for Hitachi Storage

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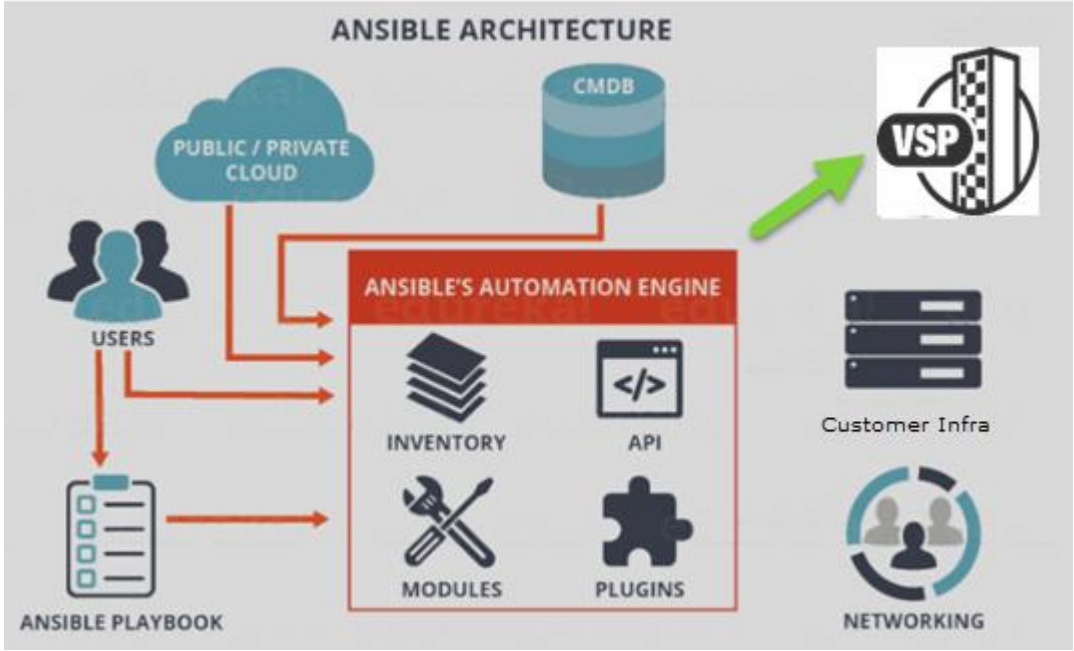
- Provide Ansible Modules collection which automates a subset of storage resources and data services specific to infrastructure automation/DevOps persona
- Covering key aspects including LUN, Hostgroup and Storage System
  - Simple rpm install (Linux)
- Follows Key Ansible principles – e.g. idempotent
- Community/Enterprise edition



NEW v2.x GA in July 2021

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Modules – Hitachi VSP (hv)

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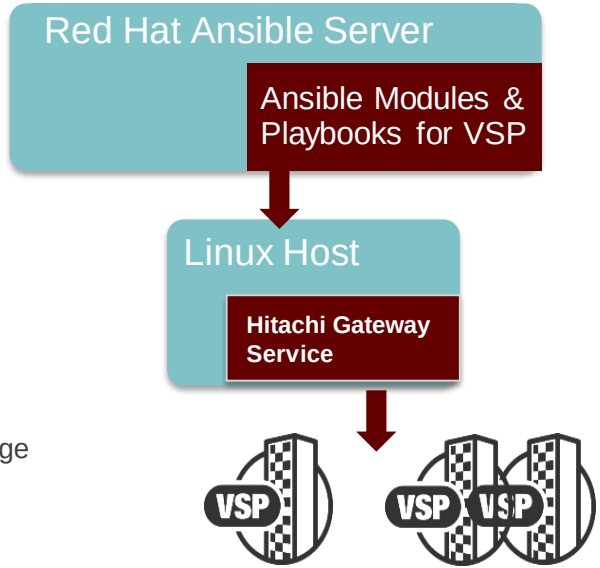
- hv_lun & hv_lun_facts:
  - Manages LUNs, provides LUN information on Hitachi storage systems
- hv_hg & hv_hg_facts:
  - Manages host groups, returns hostgroup information
- hv_storagesystem & hv_storagesystem_facts :
  - Registers & provides information on storage systems listed in the storage.json file
- hv_troubleshooting_facts: This module provides log collecting scripts for the Hitachi Storage Management Server and optional Hitachi Gateway Server



* Requirements: Hitachi Gateway Service requires 16GB Mem, 2 vCPU Linux Instance;

* Our Ansible Modules collection can be loaded onto any server instance

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Out-of-box Sample Playbooks

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1. add_storagesystems.yml
2. get_storagesystem.yml
3. create_and_map_luns.yml
4. get_lun_hex.yml
5. get_lun.yml
6. delete_lun.yml
7. find_lun_by_naa.yml
8. get_all_luns.yml
9. clone_lun_in_dp.yml
10. create_lun_parity.yml
11. create_lun.yml
12. create_multi_luns_with_count.yml
13. create_multi_luns.yml
14. expand_lun.yml
15. create_hg.yml
16. get_all_hg_query_luns.yml
17. delete_hg.yml
18. add_lun_path_hg.yml
19. delete_lun_path_hg.yml
20. get_hg.yml
21. get_support_logs.yml
22. create_cmd_devs.yml

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3 Slide Demo

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Typical Playbook

- DevOps wants two new LUNs added to their Apps Service/Server
- Variables Section: Are specified or can be passed in variables
- Playbook has two tasks
  - 1st task creates two luns
  - 2nd task maps those luns to server hostgroup
    - Result output from 1st task is used by second task
- Same Playbook, updated sizing

```
e_and_map_luns.yml
-
  name: Create new LUNs and map to hostgroup
  hosts: localhost
  collections:
    - hitachi.storage
  gather_facts: false
  vars:
#   - name: Testluns
    - pool_id: 2
    - size: 0.8GB
    - storage_serial: 123456
    - host_group_name: xyz
    - count: 2
    - ports:
      - CL1-A
  tasks:
    - hv_lun:
        state: present
        storage_serial: '{{ storage_serial }}'
        data:
          storage_pool:
            id: '{{ pool_id }}'
          size: '{{ size | default(omit) }}'
      with_sequence:  end={{count}} start=1
#     with_items: '{{ luns }}'
      register: output
    - debug: var=output

    - hv_hg:
        state: '{{ state | default(omit) }}'
        storage_serial: '{{ storage_serial }}'
        data:
          state: present
          name: '{{ host_group_name }}'
          ports: '{{ ports | default(omit) }}'
          luns: '{{ [item.lun.Lun] | default(omit) }}'
      with_items:
        - '{{ output.results }}'
      register: response
    - debug: var=response
```

Update LUN Size

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update_lun.yml

```yaml
- name: Update LUN
  hosts: localhost
  collections:
    - hitachi.storage
  gather_facts: false
  vars:
    - size: 0.8GB
    - storage_serial: 30081
    - name: sql_lun_db_1
#   - lun: 00:fe:0a
#   - lun: 65034
#   - lun: naa.60060e800875810000050758100000fe0a
#   - lun: {{ app server luns }}
    - cap_saving:
        - compression
        - deduplication
  tasks:
    - hv_lun:
        state: present
        storage_serial: '{{ storage_serial }}'
        data:
          storage_pool:
            id: '{{ pool_id | default(None) }}'
          name: '{{ name  | default(None) }}'
          size: '{{ size | default(None) }}'
          lun: '{{ lun | default(None) }}'
          cap_saving: '{{ cap_saving | default(None) }}'
      register: result
```


erved.

Onboarding Storage Systems to Ansible

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```
[root@hspai block]# more storage.json
{
 "version": "02.0.0",
 "vCenterIP": "10.76.46.122",
 "vCenterVMName": "HSP_Ansible_ISM",
 "vCenterVMHostIpAddress": "10.76.46.29",
 "vCenterCluster": "ClusterA",
 "hitachiAPIGatewayService": "10.76.46.190",




 ],
 "sanStorageSystems": [
  {
   "useOutOfBandConnection": "false",
   "comment": "this useOutOfBandConnection is optional and overwrites the top level useOutOfBandConnection"
,
   "serialNumber": 30081,
   "svpIP": "172.25.47.110",
    "poolId": 2,
    "comment3": "poolId is only required to create command devices",

                                        :10855bbf2f2de3d2c41a3bbe15e15dc2d994884ec"


   "useOutOfBandConnection": "true",
   "serialNumber": 30595,
   "svpIP": "172.25.47.112",
    "poolId": 2,
    "username": "SuperAdm",
    "key": "b2e86f45f0143ee9fa20e2cf85e8bfc643379f1b52370682e57e7b5703772af0bad30d6a"
  }
   ],
```


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Hitachi Storage Modules for Red Hat Ansible

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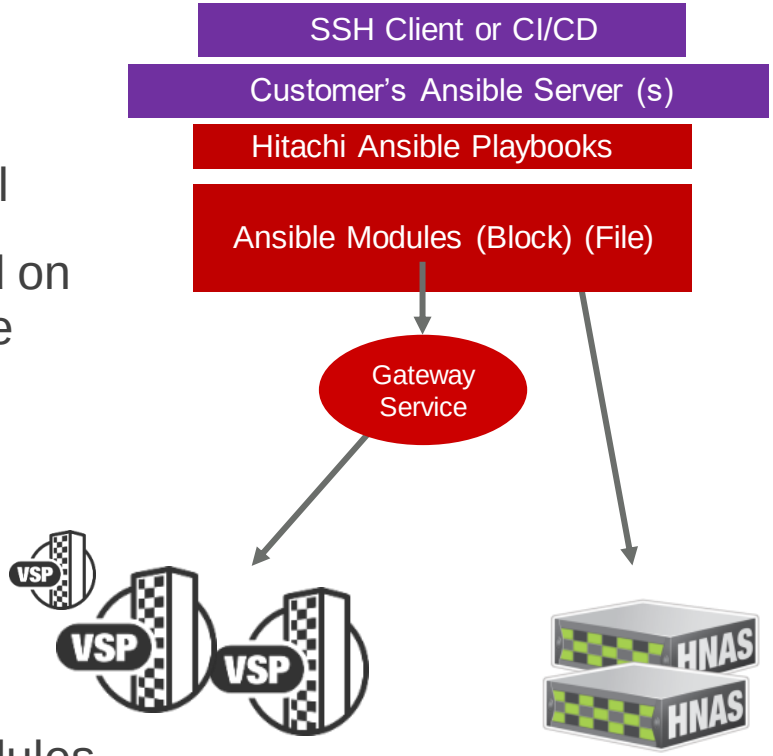
- Deployment Experience
  - Collection package which installs ansible modules, playbooks
  - Gateway service is scripted install
  - Ansible modules can be deployed on Ansible Server or gateway service
  - Communicates to VSP over FC mgmt. path
- Support
  - All VSP platforms
  - NAS team provides separate modules



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Ops Center Automator and Ansible

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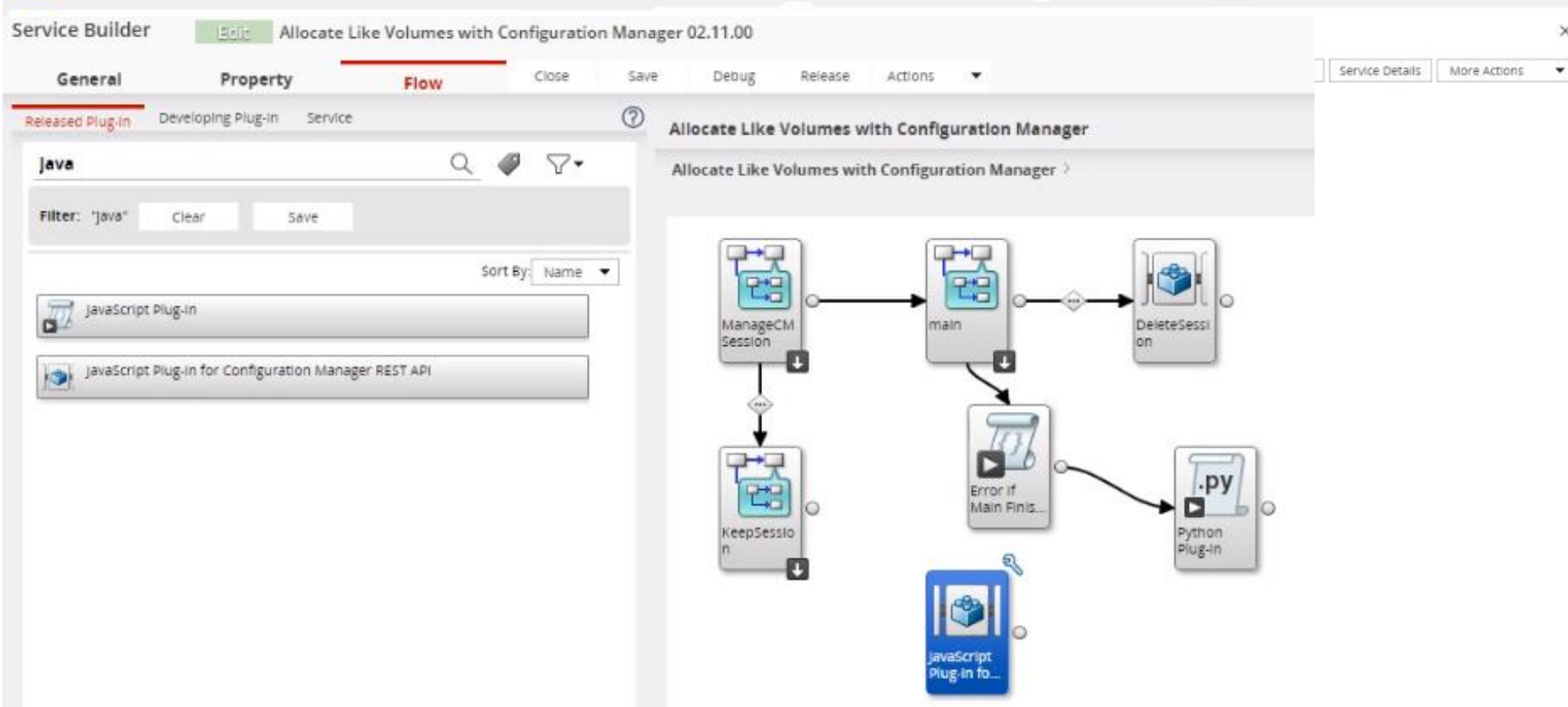
Automator Services and Ansible examples



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Example Playbook with Automator Service

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```
## Submit Task ##
- name: Submit My Request Service in Automator
  automation_submit_service:
    host: "{{had_host}}"
    port: "{{had_port}}"
    ssl: "{{had_ssl}}"
    validate_certs: "{{had_validate_certs}}"
    user: "{{had_user}}"
    password: "{{had_password}}"
    service_name: "Allocate Like Volumes with Configuration Manager"
    service_group: "Analytics Service Group"
    service_parameters:
      SourceVolume: "{\"ldevId\":144,\"label\":\"William\",\"poolId\":2,\"byteFormatCapacity\":\"100.00 GiB\"}"
      CapacityInMiB: "102400"
    task_name: "Ansible - Online Volume Create{{ range(10000, 100000) | random }}"
    task_description: "Task from my playbook"
    task_wait: "{{had_task_wait}}"
    task_timeout: "{{had_task_timeout}}"
    wait_interval: "{{had_wait_interval}}"
  register: submit_had_task
## Get Task Detail Info ##
- name: Get Task Detail Info
  automation_task_detail_info:
    host: "{{had_host}}"
    port: "{{had_port}}"
    ssl: "{{had_ssl}}"
    validate_certs: "{{had_validate_certs}}"
    user: "{{had_user}}"
    password: "{{had_password}}"
    task_id: "{{submit_had_task.outputs.task.instanceID}}"
    task_wait: "{{had_task_wait}}"
    task_timeout: "{{had_task_timeout}}"
    wait_interval: "{{had_wait_interval}}"
```


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Timelines and Packaging for Storage Modules

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Update on timelines for Ansible Initiative from Hitachi

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Alpha-BETA Preview Program

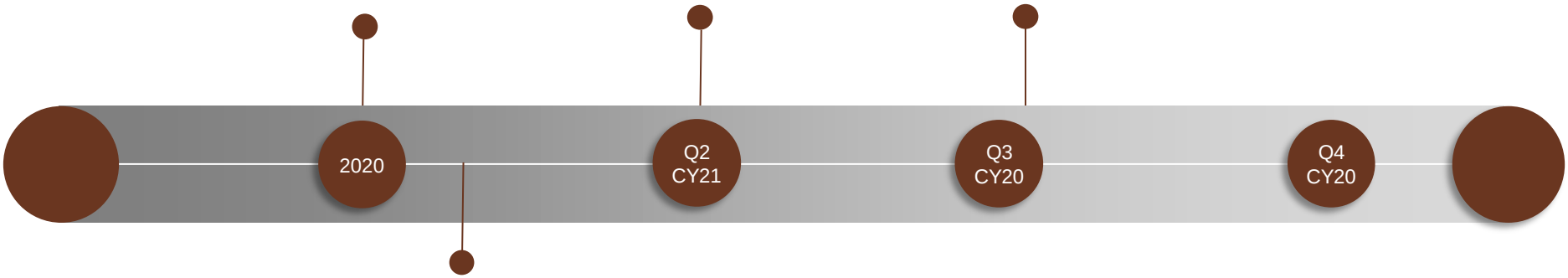
Citigroup will continue with participation in tech preview program.

General Available v2.2 Full Release – v2.2

GA offering with initial set of modules

General Available Full Release – v2.3

GA offering with RH certified modules, additional GTM activities, Subscription packaging



General Available – Restricted Release (L1)

GA offering – Limited customers, defacto community version

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Ops Center Automator and Ansible – Additional Slides

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What about Ops Center and Ansible Modules

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- Ansible Storage Modules and Ops Center Automator target different personas and use cases
  - Ansible Storage Modules are natively idempotent and tailored for DevOps while Automator focused on “Storage/Infra admin
- You could view Ops Center Automator at a higher catalog service layer while Ansible Modules are at lower configuration and infrastructure as code layer.
- Two scenarios
  - Ops Center Automator has an extension to allow services to be called from Ansible if required
  - A customer could use Storage modules and Automator together effectively as part of “deployment as a service”

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Ops Center Automator as the catalog service

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- Infrastructure and cloud teams need “Deployment as a service”
  - Wrap Infrastructure as code (or templates) with orchestration (approvals, manual interactions, other systems)
  - Track and manage provisioned environments
  - Publish orchestrations into a service catalog
  - Cost tracking and workload placement guidance
- Ops Center Automator can extend IAC tasks handled by Ansible into full “deployment as a service” catalog service.

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New in Q3 – Global Automation Services can enable Automator to call playbooks directly – "Deployment as a service"

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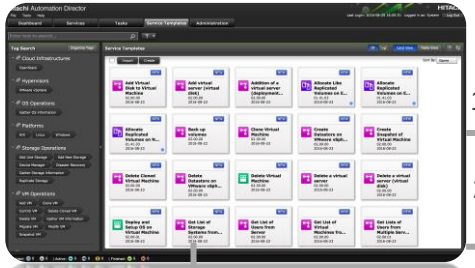

Ops Team / Tenant – Select Catalog item

1. Change Control

2. Approval

Automator Service/Task

Update ServiceNow Ticket / Approval emails

3. Execute Playbooks

Hitachi Storage Modules (**NEW**)

1a) Add Server WWNs to HG

Hostgroup for Cluster

DS

2a) Create NFS share for Apps

HNAS – NFS Export

Configuration Files

playbook .yml

configures

Ansible

Non-Hitachi Modules

Apps, Guest OS or Other Infra mgmt.

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Example Scenario with 10.2

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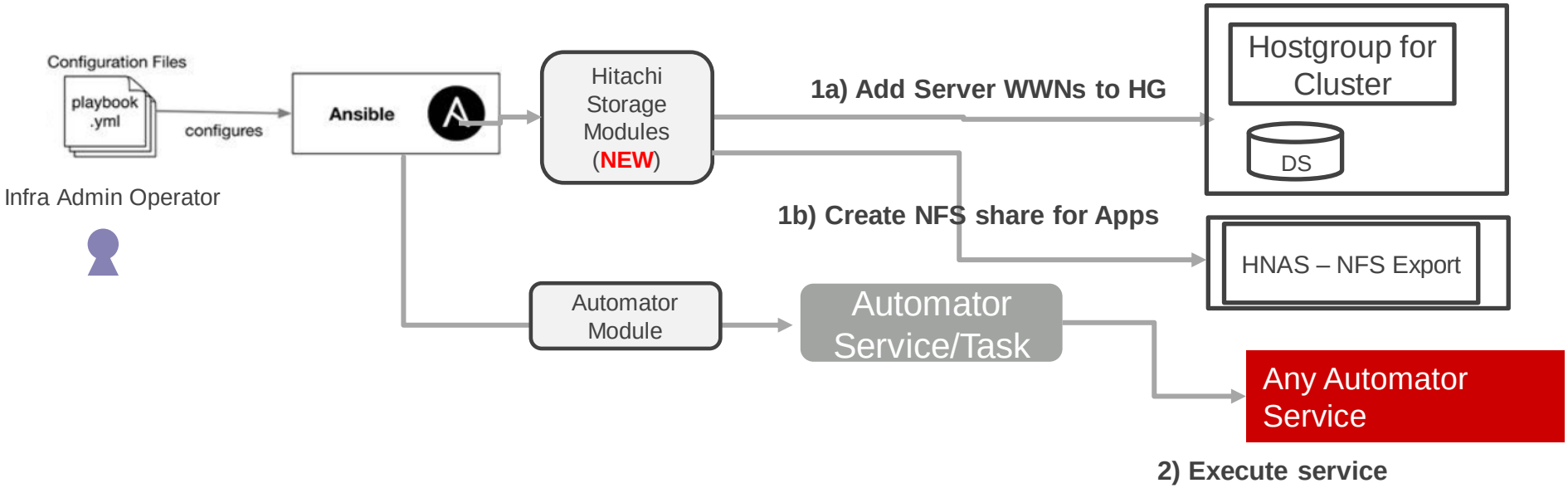
- Ops is adding new server into Cluster + needs to enable storage access (lun mapping) for existing volumes and 2) create NFS export for apps team. 3) update CMDB (e.g ServiceNow) for change process control
- Run playbook to call respective modules in hv and automator modules



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Q3: Offering Overview: Build and Deliver Ansible Modules & Playbooks for Hitachi VSP Storage

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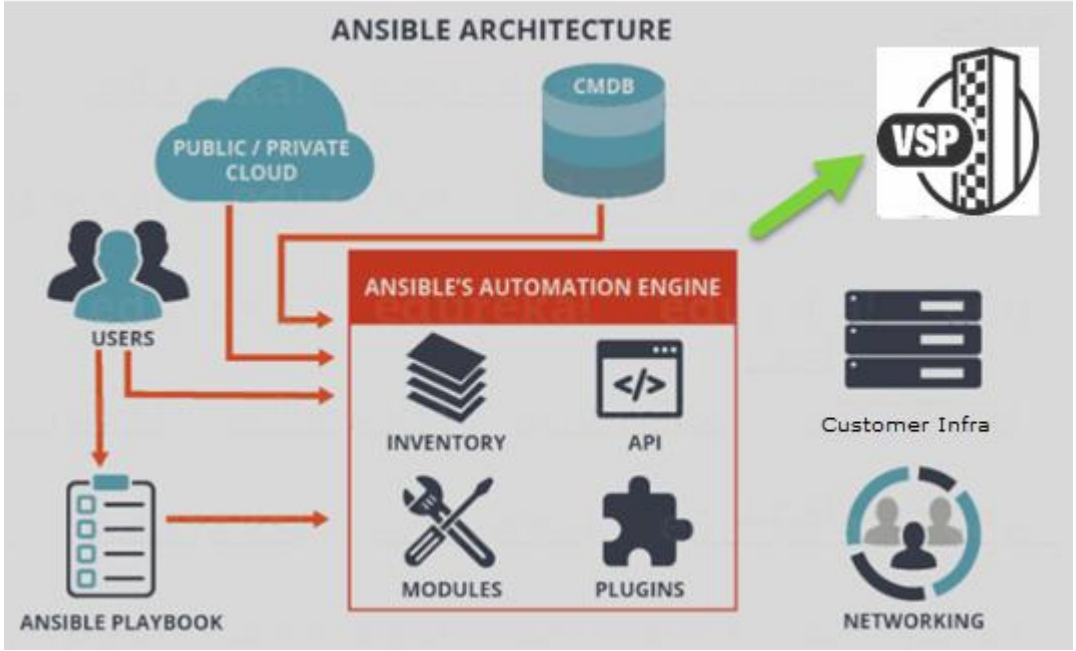
- Provide Ansible Modules which automates a subset of storage resources and data services specific to infrastructure automation persona

```
name:  Unpresent LUN / Remove LUN Paths
hosts: localhost
gather_facts: false
vars:
  - host_group_name: test-ansible-hg-1
  - luns:
    - 800
    - 801
  - storage_serial: 12345
  - state: absent
tasks:
  - hv_hg:
      state: present
      storage_serial: '{{ storage_serial }}'
      data:
        state: '{{ state | default(omit) }}'
        host_group_name: '{{ host_group_name }}'
        ports: '{{ ports | default(omit) }}'
        luns: '{{ luns }}'
    register: result
```



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Ansible and DevOps – Background Information

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Apps and Infrastructure Environment

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- What typically happens to get developers code running
  - Access Infrastructure (i.e Compute, Network and Storage)
  - Build Server Config and Configure Middleware
  - Deploy Application code and database schema updates from Git
  - Test with masked Copies of Production data
  - Test with External Dependencies (Mimic external services)
  - Management – Performance, Availability and UX Monitoring
- Where does it run
  - Servers, VMs, public clouds, Kubernetes clouds, SaaS
- Desire to move Traditional Operations -> Modern Operations

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Why Automate – Infrastructure as code goals

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- Consistency
  - Serialize Tribal Knowledge and Operational Intuition into code
- Resilience
- Repeatability
- No Friction, Go Fast
  - Reduce time to completion, Get infra tasks done faster

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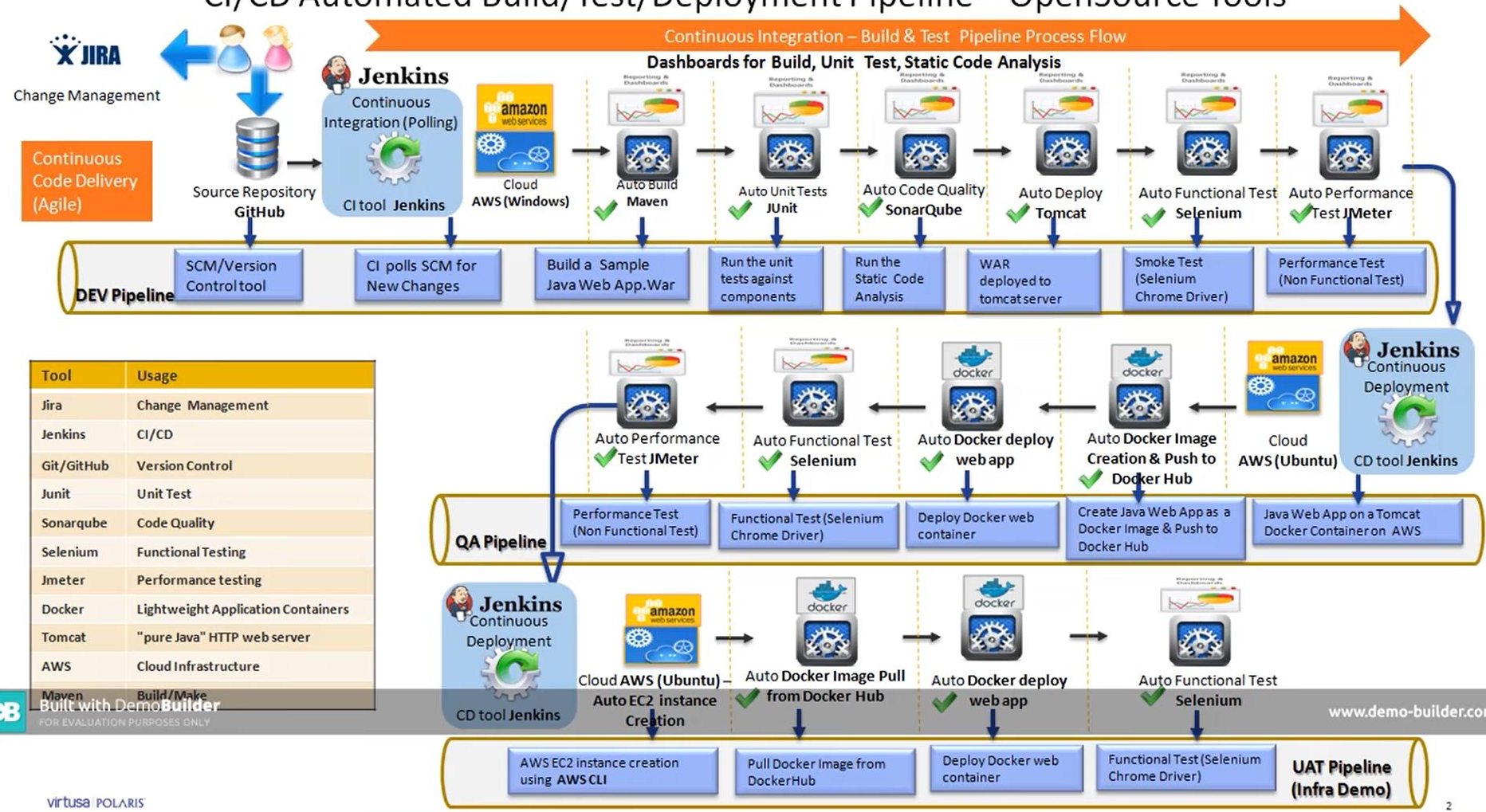
CI/CD Automated Build/Test/Deployment Pipeline – OpenSource Tools



Tool	Usage
Jira	Change Management
Jenkins	CI/CD
Git/GitHub	Version Control
Junit	Unit Test
Sonarqube	Code Quality
Selenium	Functional Testing
Jmeter	Performance testing
Docker	Lightweight Application Containers
Tomcat	"pure Java" HTTP web server
AWS	Cloud Infrastructure
Maven	Build/Make

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Example with Ansible and CI/CD

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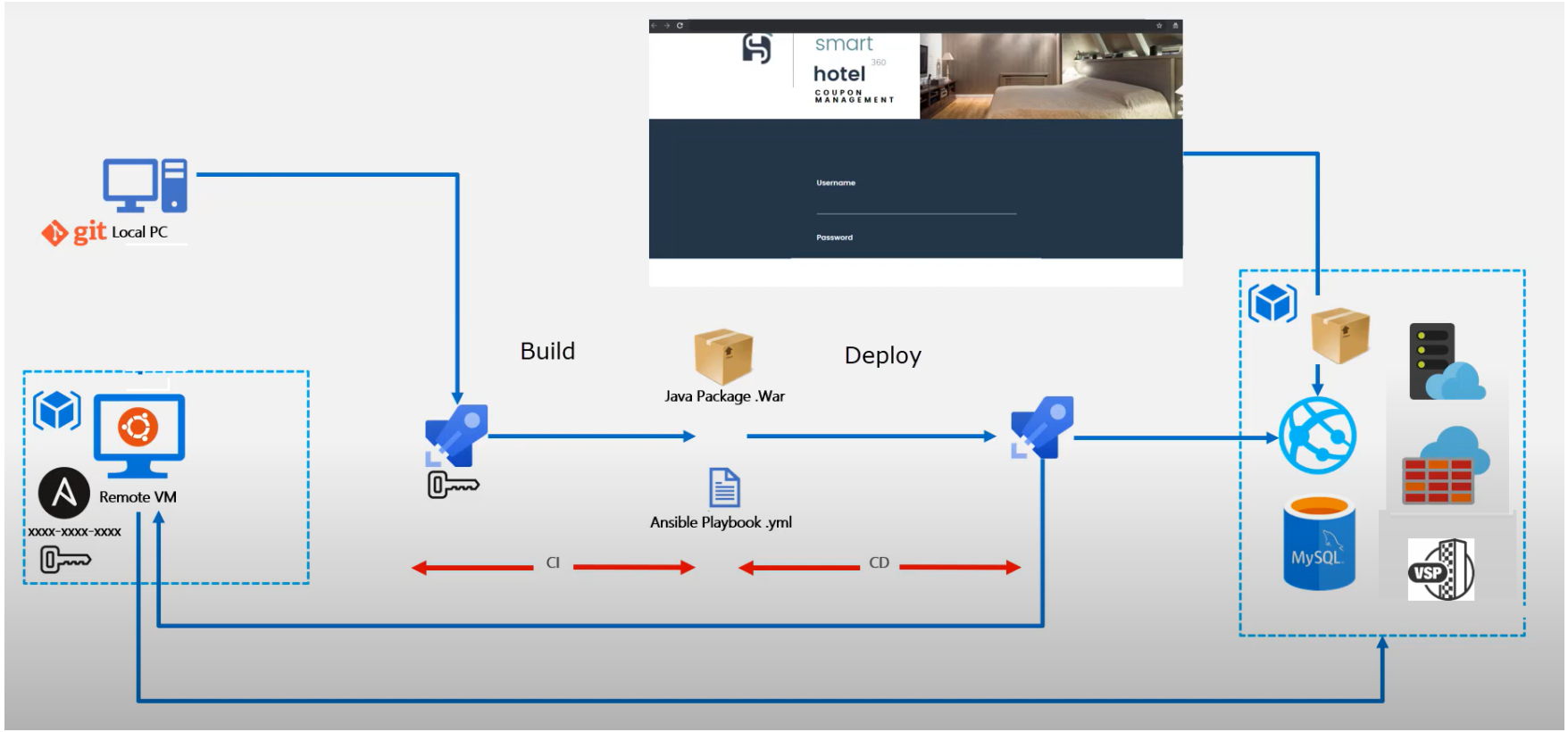

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Additional Slides

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root@hspai:/opt/hitachi/ansible/my_playbooks/block

```
[root@hspai block]# ./ap get_hg_cluster.yml
[WARNING]: provided hosts list is empty, only localhost is available.

PLAY [Get Hostgroup Info] ******************************************

TASK [hv_hg_facts] *************************************************
ok: [localhost]

TASK [debug] *******************************************************
ok: [localhost] => {
    "result": {
        "changed": false,
        "failed": false,
        "hostGroups": [
            {
                "HgName": "ucp2k-c1-b3b4_c2-b1b2",
                "HostMode": "LINUX",
                "HostModeOptions": [],
                "HostgroupID": 12,
                "Port": "CL1-A",
                "ResourceGroupId": 0,
                "WWNS": [],
                "hostModeOptions": null
            },
            {
                "HgName": "ucp2k-c1-b3b4_c2-b1b2",
                "HostMode": "VMWARE_EXTENSION",
                "HostModeOptions": [
                    63,
                    114
                ],
                "HostgroupID": 1,
                "Port": "CL5-A",
                "ResourceGroupId": 0,
                "WWNS": [
                    "10000090FAD690FE",
                    "10000090FAD6D1C2",
                    "10000090FAD690FF",
                    "10000090FAD6D1C3",
                    "10000090FAD695EC",
                    "10000090FAD6D180",
                    "10000090FAD695ED",
                    "10000090FAD6D181"
```

Example

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- Ops added new server for apps team, playbook querying for WWNs in a hostgroup
  - #ansible-playbook get_hg_cluster.yml

get_hg_cluster.yml | delete_lun_path_vasahg.yml | get_hg_vasa

```
---
name:  Get Hostgroup Info
hosts: localhost
gather_facts: false
vars:
  - storage_serial: 30081
  - hgName: ucp2k-c1-b3b4_c2-b1b2
  - query:
      - wwns
tasks:
  - hv_hg_facts:
      storage_serial: '{{ storage_serial }}'
      data:
        query: '{{ query | default(omit) }}'
        lun: '{{ lun | default(omit) }}'
        name: '{{ hgName | default(omit) }}'
        ports: '{{ ports | default(omit) }}'
    register: result
  - debug: var=result.hostGroups
```


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Sample Playbooks

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```yaml
name: Create Universal Replicator Pair
hosts: localhost
gather_facts: false
vars:
  - storage_serial: 12345
  - target_storage_serial: 123456
  - lun: 16502
  - lun_journal_id: 1
  - target_lun: 16650
  - target_lun_journa
tasks:
  - hv
```

```yaml
name: Get Spec
hosts: localho
gather_facts:
vars:
  - storage_se
  - hgName: te
  - ports:
    - CL1-A
    - CL2-B
tasks:
  - hv_hg_fact
    storage_
    data:
      query:
      lun: '
      name:
      ports:
  register:
  - debug: var
```

```yaml
name: Create Host Group
hosts: localhost
gather_facts: false
vars:
```

```yaml
name: Testing Create Multiple LUN With Count In DP
hosts: localhost
gather_facts: false
vars:
  - pool_id: 6
```

```yaml
name: Create LUN In Storage
hosts: localhost
gather_facts: false
vars:
  - name: ORA_LUN_C
  - pool_id: 2
  - size: 1000GB
  - storage_serial: 30081
tasks:
  - hv_lun:
      state: present
      storage_serial: '{{ storage_serial }}'
      data:
        storage_pool:
          id: '{{ pool_id }}'
        name: '{{ name  | default(omit) }}'
        size: '{{ size }}'
        lun: '{{ luns| default(omit) }}'
    register: result
  - debug: var=result
```

```yaml
name: Adding wwns to cluster hostgroup
hosts: localhost
gather_facts: false
vars:
  - host_group_name: ESXi_Cluster_A_hg
  - ports:
    - CL5-A
  - storage_serial: 30081
  - wwns:
    - 100000109B583B2D
    - 100000109B583B3C
tasks:
  - hv_hg:
      state: '{{ state | default(omit) }}'
      storage_serial: '{{ storage_serial }}'
      data:
        state: present
        host_group_name: '{{ host_group_name }}'
        ports: '{{ ports | default(omit) }}'
        luns: '{{ luns | default(omit) }}'
        wwns: '{{ wwns | default(omit) }}'
    register: result
  - debug: var=result
```

```yaml
tasks.
  - hv_hg:
      state: present
      storage_serial: '{{ storage_serial }}'
      data:
        state: '{{ state | default(omit) }}'
        host_group_name: '{{ host_group_name }}'
        ports: '{{ ports | default(omit) }}'
        luns: '{{ luns }}'
    register: result
```


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Ansible and States

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```
name:  Unpresent LUN / Remove LUN Paths
hosts: localhost
gather_facts: false
vars:
  - host_group_name: test-ansible-hg-1
  - luns:
    - 800
    - 801
  - storage_serial: 12345
  - state: absent
tasks:
  - hv_hg:
      state: present
      storage_serial: '{{ storage_serial }}'
      data:
        state: '{{ state | default(omit) }}'
        host_group_name: '{{ host_group_name }}'
        ports: '{{ ports | default(omit) }}'
        luns: '{{ luns }}'
    register: result
```


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Modules – Hitachi VSP (hv)

- hv_lun & hv_lun_facts:
  - Manages LUNs, provides LUN information on Hitachi storage systems
- hv_hg & hv_hg_facts:
  - Manages host groups, returns hostgroup information
- hv_storagesystem & hv_storagesystem_facts :
  - Registers & provides information on storage systems listed in the storage.json file
- hv_rep & hv_rep_facts :
  - Creates, Manages and Provides Thin Image, True Copy, Universal Replicator and Global Active Device replication pair services
- hv_vsm & hv_vsm_facts :
  - Creates and Manages VSMs
- hv_evs_facts, hv_nfs_share, hv_file_systems_facts, hv_fs_facts
  - Registers and Manages HNAS/NFS shares
- hv_troubleshooting_facts: This module provides log collecting scripts for the Hitachi Storage Management Server and optional Hitachi Gateway Server

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