SAS® GLOBAL FORUM 2018

USERS PROGRAM

April 8 – 11 | Denver, CO
Colorado Convention Center

#SASGF

SAS® Configuration Management with Ansible

What is configuration management?

"Configuration management (CM) is a systems engineering process for establishing and maintaining consistency of a product's performance, functional, and physical attributes with its requirements, design, and operational information throughout its life."

ANSI-EIA-649-A Standard: NATIONAL CONSENSUS STANDARD FOR CONFIGURATION MANAGEMENT

Why is configuration management important?

The practice of handling changes systematically so that a system maintains its integrity over time[1]

- Reduce risks due to ad-hoc changes
  - Operating System Configuration
  - SAS Home Configuration
  - SAS Level Configuration

[1] Wikipedia https://en.wikipedia.org/wiki/Configuration_management

Configuration Management for SAS

- Can be applied to many aspects of a “system”
  - Data Integration/ETL
  - Reports
  - Custom built SAS Applications/Programs
  - Environment

SAS Environment configuration

Overview

- We will look at three configuration aspects of a SAS Environment
  - Pre-requisites
  - Binaries (SAS Home)
  - Configuration (e.g. Lev1)

SAS Environment

Pre-requisites

- Users
  - SAS Installation User
  - SAS Spawned Servers User
- Groups
  - SAS Server Users
- Directory Permissions
  - For SAS Home
  - For SAS Config
  - For SAS Work
- Disks
  - Space
- Authentication
  - Active Directory
  - LDAP
- Operating System Rights
  - Log on as a Batch Job
- Kernel Parameters
  - Open Files

SAS Environment

SAS Home Directory

- File permissions
  - setuid bit
- sassw.config
  - SASENVIRONMENTSURL
- sasv9_local.cfg
  - -WORK
  - -MEMSIZE
- SAS Deployment Agent
  - daemon/service
- SAS Data Management Server
  - daemon/service
- Deployment Registry
  - Check for Hot Fixes

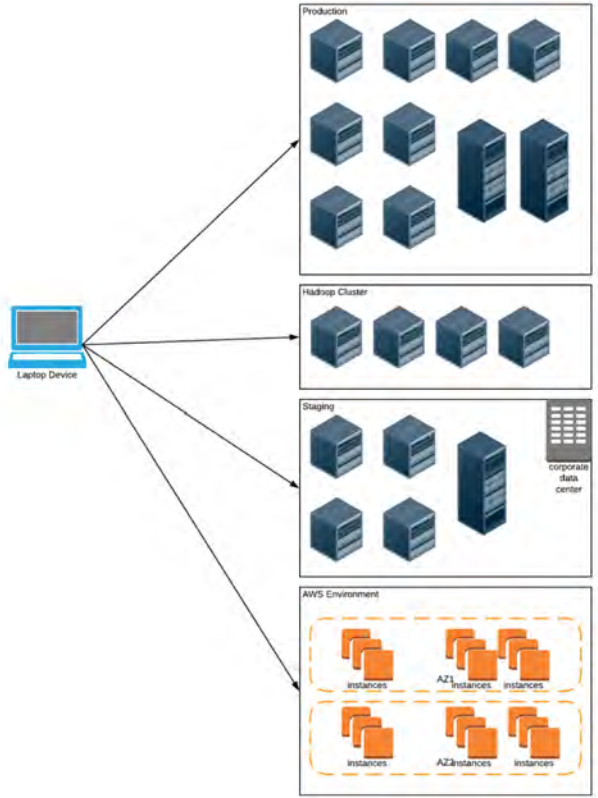
SAS Environment

Configuration (e.g. Lev1) Directory

- Directory Permissions
- Object Spawner config
- SASApp
  - *_usermod files
- SASMeta
  - Security
  - User Sync

Ansible

What is Ansible?



Multiple hosts
On-premise / Multi-Cloud / Hybrid

No agents required

Supports *nix / Windows

Extendable

Ansible

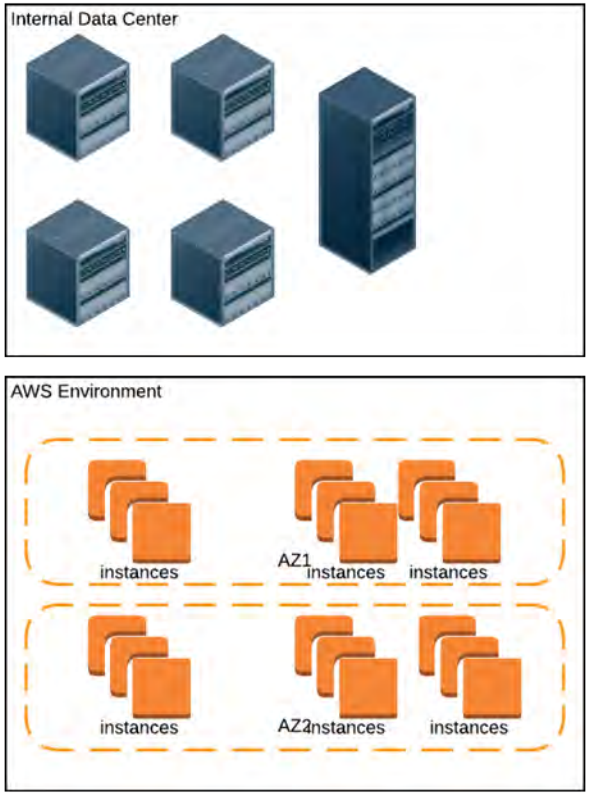
The Controller

Ansible Host

- Linux OS or Windows Subsystem for Linux
- Communication with all hosts to be managed.
- Python 2.7 / 3x

Ansible

Your Hosts

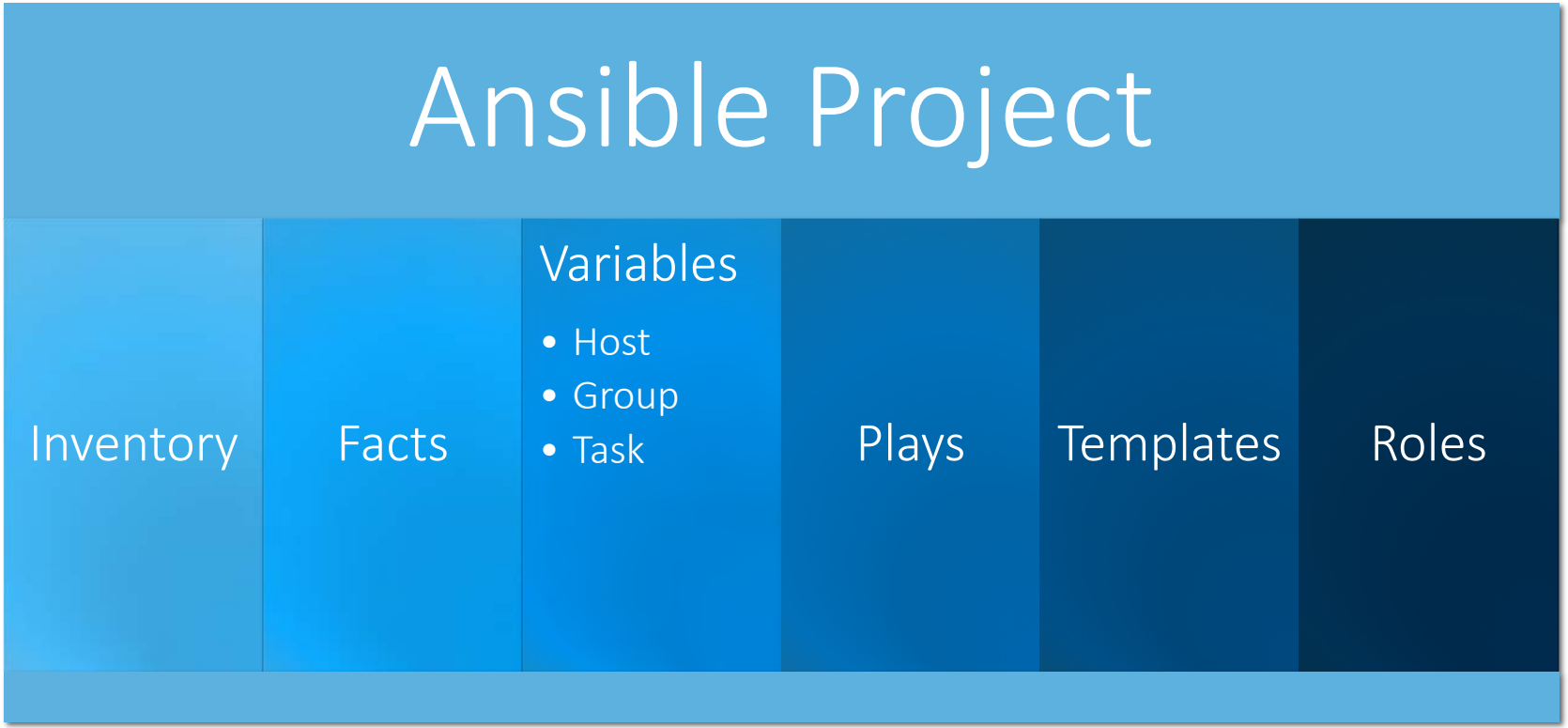


Hosts

- Can communicate with your controller
- Multi - OS Supported.
- Windows requires Powershell remoting.
- SSH Preferred

Ansible

Ontology



Ansible

Inventories

```
machine1 ansible_host=meta.myhost.com ansible_port=22 ansible_user='sas'
machine2 ansible_host=compute.myhost.com ansible_port=22 ansible_user='sas'

[compute_servers]
machine2

[midtier_servers]
machine1

[metadata_servers]
machine1

[sas_servers:children]
metadata_servers
midtier_servers
compute_servers
```

- Dynamic or Static.
- Define your servers and group them by management function.
- E.G: AWS, tags are your friends.
- Connection params support using variables.

Ansible

Facts


```
"ansible_nodename": "ip-10-2-0-22",
"ansible_os_family": "RedHat",
"ansible_pkg_mgr": "yum",
"ansible_processor": [
    "0",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz",
    "1",
    "GenuineIntel",
    "Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz"
],
"ansible_processor_cores": 2,
"ansible_processor_count": 2,
"ansible_processor_threads_per_core": 1,
"ansible_processor_vcpus": 2,
"ansible_product_name": "HVM domU",
"ansible_product_serial": "NA",
"ansible_product_uuid": "NA",
"ansible_product_version": "4.2.amazon",
```


- Describe your Hosts and Applications.
- Ansible will collect Host Facts.
- Custom processes can create Application facts.
- For SAS,
  - sassw
  - sas_config
  - sas_install

Ansible

Plays

```
- name: Gather IR Studio Config Files
  become: yes
  become_user: sas
  become_method: sudo
  find:
    paths: "{{sas_config}}/{{sas_lev}}/{{ir_studio_home}}/work/"
    patterns: "*.db"
  register: ir_studio_conf

- name: Update IR Studio
  become: yes
  become_user: sas
  become_method: sudo
  replace:
    path: "{{ item.path }}"
    regexp: "Not\ Running"
    replace: "Running"
    backup: no
  with_items: "{{ ir_studio_conf.files }}"

- name: Update Web Config Files with Public DNS
  replace:
    path: "{{ item.file }}"
    regexp: "{{ item.rgx }}"
    replace: "{{ ec2_ip_address }}"
    backup: yes
  with_items: "{{ midtier_sed }}"
```

- Execute commands on your target hosts.
- Executed within a Playbook
- Accepts input / output variables, filters, looping
- Can be async.

Ansible

Variables

```
# As Yaml
dostuff: yes
other: no

- { dostuff: yes, other: no }

# As INI
[section]
dostuff yes
other no

# As Python Dictionary
{
  "dostuff": True,
  "other": False
}
```

- Supports INI, Json, Dictionary, YAML structure
- Can be set nearly anywhere in your project.
- Beware of precedence.

Ansible

Variable Precedence

- Be aware of variable precedence
- Example:
  - Ansible Role Default
    - allow_x_cmd: yes
  - Ansible Playbook Variable
    - allow_x_cmd: no
- Which one is set?

Ansible

Templates

```
/**
*
* Note: This file is managed by Ansible.  Do not edit directly.
* Doing so will mean your going to have a bad time.
*
*/

{% if '/opt/saswork' in ansible_mounts | lower %}
- work /opt/saswork
- utilloc /opt/saswork
{% else %}
- work /home/!username
- utilloc /home/!username
{% endif %}

-MEMSIZE {{ ansible_memory_mb.real.total/4|round|int }}G
-SORTSIZE {{ ansible_memory_mb.real.total/8|round|int }}G
-BUFSIZE 64K
-UBUFSIZE 64K
-IBUFSIZE 32767
-BUFNO 10
-UBUFNO 10
-IBUFNO 10
-ALIGNSASIOFILES
```

```
---
- name: Create SAS Usermods Config
  template:
    src: sas_v9_usermods.tmpl
    src: "{{ sas_config_home}}/{{ item }}/sasv9_usermods.cfg "
  with_items:
    - Lev1/SASApp
    - Lev1/SASMeta
```

Ansible

Roles

Folder	Purpose
Tasks	Playbooks which execute specific tasks
Handlers	Handlers are special tasks that can execute based on conditions. Examples might include restarting a service after a specific file has changed.
Files	Static files which are to be transported to your target host.
Templates	Jinja2 templates which Ansible will parse into files before execution
Vars	Variables
Defaults	Default variables
Meta	Metadata about the role for ansible-galaxy to identify the role

Ansible

Structuring Your Project

- ansible-playbook –i environments/production site.yml –l compute_servers

```
|-- ansible.cfg
|-- vault
|-- README.md
|-- site.yml
|-- metadata_servers.yml
|-- midtier_servers.yml
|-- compute_servers.yml
|-- hadoop_servers.yml
|-- va_servers.yml
|-- environments/
|   |-- staging
|   |-- production
|-- group_vars/
|    |-- main.yml
|-- host_vars/
|    |-- main.yml
|-- plays/
|   |-- os.yml
|   |-- sasconfig.yml
|   |-- hotfix.yml
|-- roles/
|   |-- requirements.txt
|   |-- selerity.xxx
|   |-- geerlinguy.xxx
```

Mapping SAS Configuration Tasks to Ansible

Plays

Installation	Configuration	BAU
metadata_servers.yml	os.yml	di_provision.yml
midtier_servers.yml	config.yml	hotfix.yml
compute_servers.yml	sasconfig.yml	promotion.yml
hadoop_servers.yml		

- Structure into small includable plays.
- Use tags
- Handle idempotence in shell script Plays

Mapping SAS Configuration Tasks to Ansible

Playbooks

- Structure Playbooks as an amalgam of Plays and Roles.
- site.yml should be constructed of only includes.

Mapping SAS Configuration Tasks to Ansible

Roles

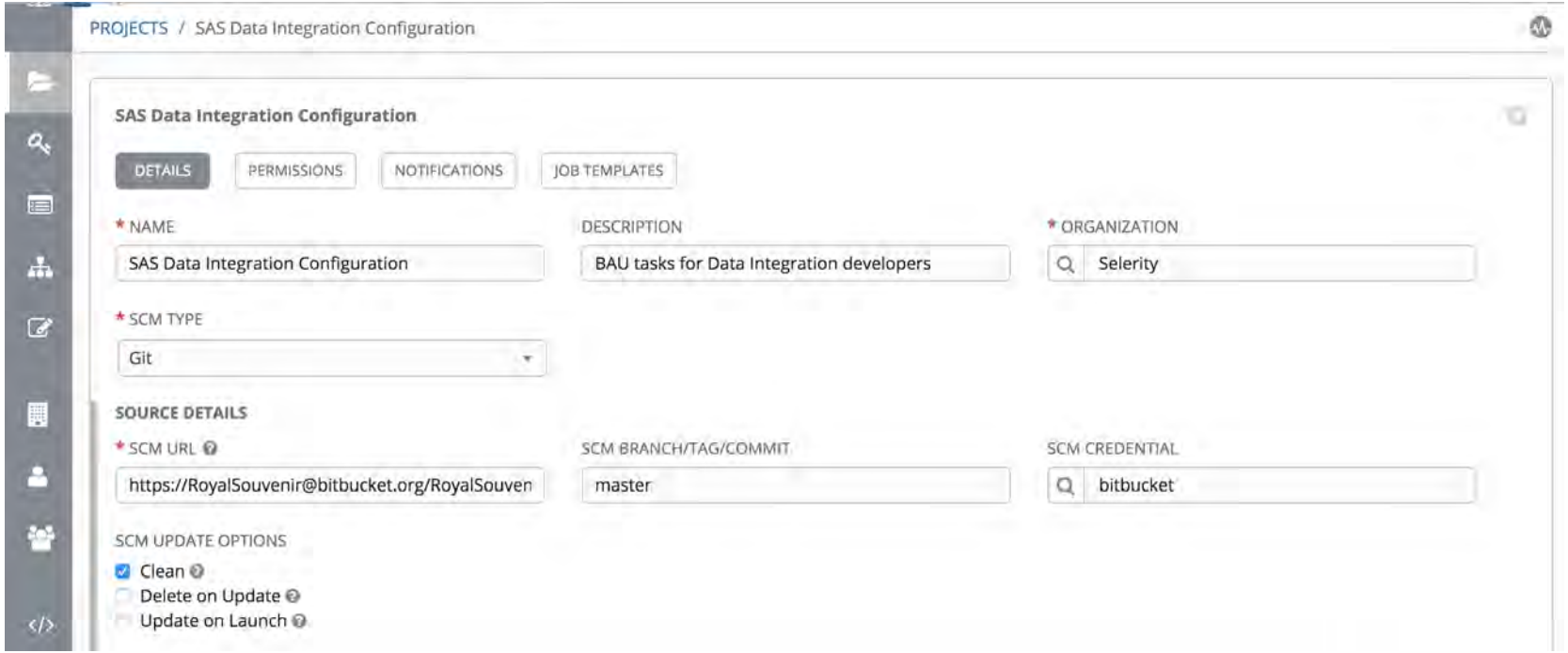
```yaml
- hosts: all
  become: yes
  become_method: sudo

  vars:
    selerity_customer: dummy

  vars_files:
    - "group_vars/common.yml"
    - "group_vars/customer_{{ selerity_customer }}.yml"

  roles:
  - role: selerity.os.roles
  - role: selerity.os.packages
  - role: selerity.os.filesystem
  - role: selerity.os.kernel
  - role: selerity.os.pam
  - role: selerity.os.tz
```

Governance and Maintenance



Presenter

Michael Dixon, Managing Director, Selerity

Michael's love for all things technical – especially in taking things apart, seeing how they work, and putting them back together – makes him a natural problem solver. His client-centric and solutions-based approach has enabled him to work seamlessly with businesses across multiple segments - helping them exceed their goals in the process.

@SelerityMichael

Presenter

Cameron Lawson, Services Manager, Selerity

Cameron's love for Computer Science began as a child programming games on his Vic 20. He started using SAS in the mid 90's. Over a 20 year career, Cameron has become a leading consultant on analytic and data architecture, strategy, governance and operations and is a trusted advisor to many leading companies in the Australia – Pacific region.

@royalsouvenir

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