



SAS[®] GLOBAL FORUM 2018

USERS PROGRAM

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#SASGF

SAS[®] Configuration Management with Ansible

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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 time¹

- 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 Spawnd 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

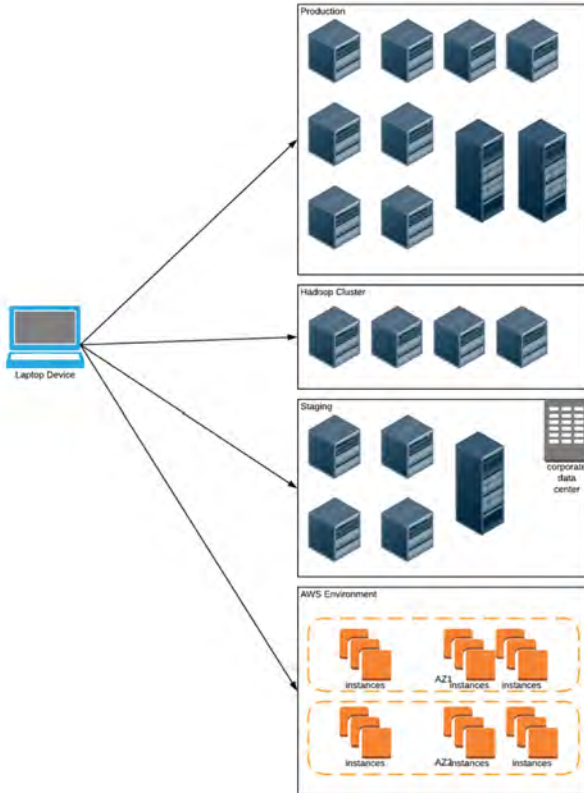
Configuration (e.g. Lev1) Directory

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



Ansible

What is Ansible?



Multiple hosts
On-premise / Multi-Cloud / Hybrid

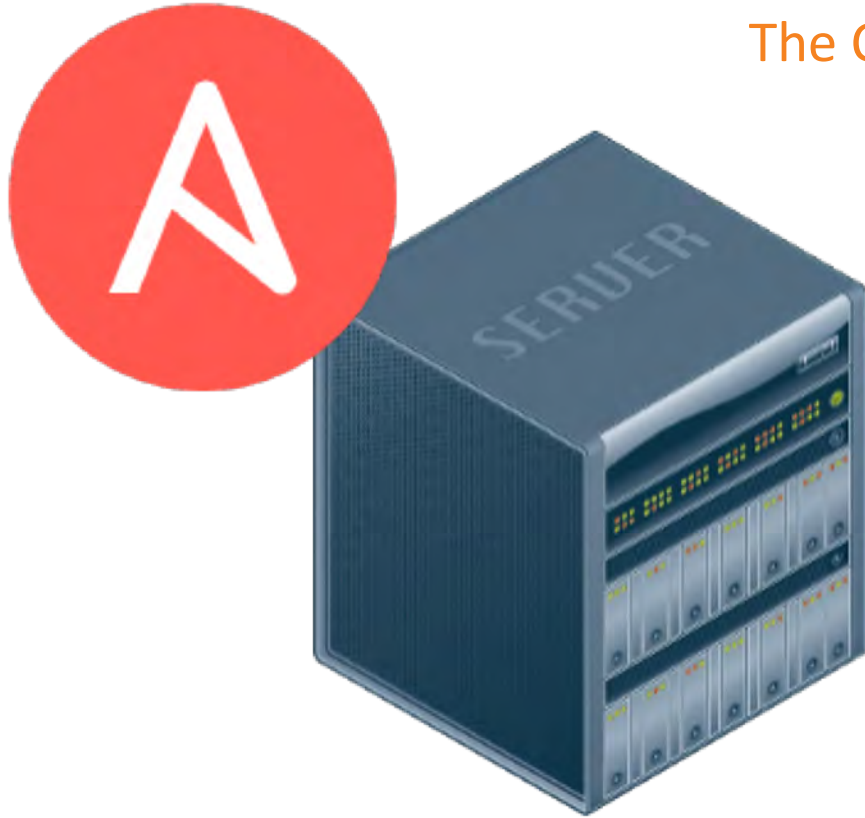
No agents required

Supports *nix / Windows

Extendable

Ansible

The Controller



Ansible Host

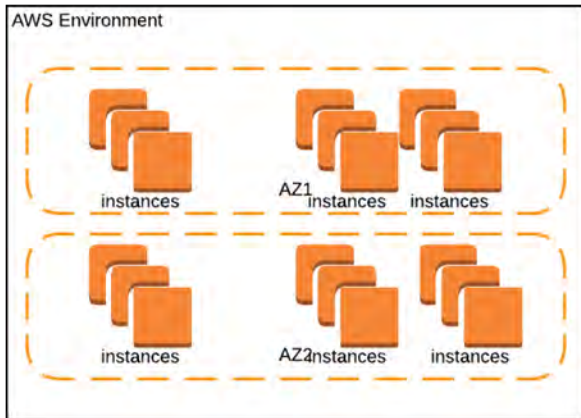
Linux OS or Windows
Subsystem for Linux

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 Project

Inventory

Facts

Variables

- Host
- Group
- Task

Plays

Templates

Roles

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.tpl  
    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

```
- 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
```

```
selerity.aws.route53
├── defaults
├── handlers
├── meta
├── tasks
├── tests
└── vars

selerity.os.filesystem
├── defaults
├── files
├── handlers
├── meta
├── tasks
├── templates
├── tests
└── vars

selerity.os.kernel
├── defaults
├── handlers
├── meta
├── tasks
├── tests
└── vars
```


Governance and Maintenance

PROJECTS / SAS Data Integration Configuration

SAS Data Integration Configuration

DETAILS | PERMISSIONS | NOTIFICATIONS | JOB TEMPLATES

* NAME: SAS Data Integration Configuration

DESCRIPTION: BAU tasks for Data Integration developers

* ORGANIZATION: Selerity

* SCM TYPE: Git

SOURCE DETAILS

* SCM URL: https://RoyalSouvenir@bitbucket.org/RoyalSouven

SCM BRANCH/TAG/COMMIT: master

SCM CREDENTIAL: bitbucket

SCM UPDATE OPTIONS

Clean

Delete on Update

Update on Launch

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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