ansible

simple IT automation

Prerequisites

- Familiarity with Linux commands
- Basic knowledge on networking concepts
- Basic Knowledge on Networking(CIDR blocks, subnet etc.)
- Target Audience
  - System administrators
  - Software developers in a DevOps role
  - Anyone who wants to learn!!

About you

- Please tell me about Yourself:
  - Your Name
  - Your background
  - What is the purpose of this course?
  - Where and how you will be using this knowledge?
  - What do you currently know about Ansible?

About me

- ❖ Your Trainer : Deepak Gupta(@hellodk01)
- ❖ Experience : 9+ Years
- ❖ Certifications
  - ➢ Blockchain for Developers
  - ➢ Interfacing with the Raspberry Pi
  - ➢ Big Data, Cloud Computing, & CDN Emerging Technologies

About me

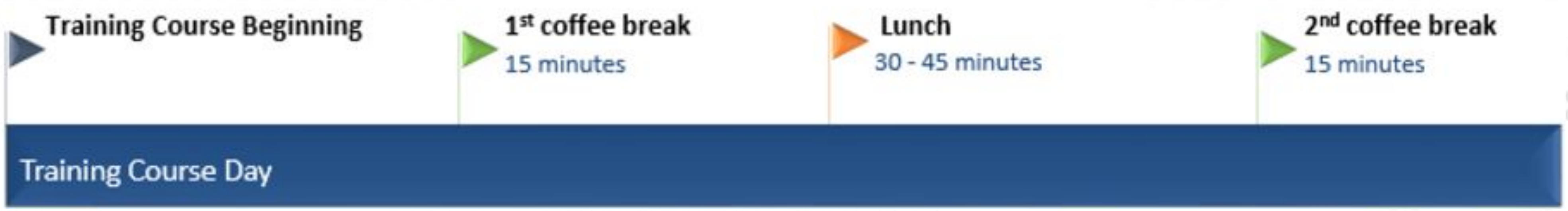
- Industry Roles
  - Devops Lead, MoveinSync
  - Systems Engineer, Myntra Designs
  - Devops Engineer, Knowlarity Communications
  - Software Engineer, Wipro Technologies
- Hobbies :
  - Photography
  - Travelling
  - Trekking

Trainings Delivered

❖ Cloud Computing	AWS Solutions, Azure DevOps
❖ Container Technologies	Docker, Kubernetes
❖ Monitoring Tools	Sensu, Zabbix, Nagios, Icinga2
❖ SQL Databases	MySQL, PostgreSQL, MariaDB
❖ NoSQL Databases	MongoDB, Cassandra, Redis, Gemfire
❖ Web Server	Nginx Setup and Configurations
❖ Messaging Tools	RabbitMQ, Kafka
❖ Configuration Management	Ansible, Chef, Puppet, Saltstack
❖ Architecture	Microservices, DevOps, DevSecOps
❖ Programming	Java, Python, Golang, rust, haskell

Course Organization

- Hours: 9:30 hrs to 17:30 hrs IST
- Breaks:



- We would be using Ubuntu 18.04 as our primary OS

Course Organization

- ❖ Organize yourself into groups
- ❖ Make sure that members of each group sit together
- ❖ I hope lab details are already shared with you all
    - ➢ your VM's are up and running
    - ➢ if not execute the steps as mentioned in the document already provided

Credits

- some of the images/materials may be borrowed from the internet and not owned by us
- we would extend our gratitude to the original content authors of those images/contents

Materials

- ❖ Slides
  - ➢ Day wise slides – Before the session starts
  - ➢ Final sides – On the last day
- ❖ Additional Reading materials
  - ➢ First day
- ❖ Specific references/materials
  - ➢ Upon request and time frames

Guidelines for the session

- ❖ Please login 10 minutes before the time
- ❖ Please do a check on your network connection and audio before the class to have a smooth session
- ❖ All participants will be on mute, by default
- ❖ Unmute yourself when requested or as needed
- ❖ Ask and answer questions to make your learning interactive
- ❖ Most often logging off or rejoining will help solve the tool related issues

- Introduction to Ansible
  - history and reason for development of Ansible
  - Brief comparison with Saltstack and others
  - Benefits and limitations of using Ansible
  - Ansible Architecture & core components
  - Learning Environment
  - Yaml Syntax
- Quick Examples
  - What is an ad-hoc command
  - Ad-hoc commands examples
  - discussions about the ansible command

- ❖ Inventories in Ansible
  - ➢ Static Inventories
  - ➢ Dynamic Inventories
- ❖ Ansible Playbooks
  - ➢ Commonly used Modules
  - ➢ Using modules in playbooks
  - ➢ Register, Debug, stdout & stderr
- ❖ Using Conditionals
- ❖ Error Handling in Playbooks
- ❖ Tagging tasks in Playbooks

- ❖ Templates
- ❖ Using Ansible facts
- ❖ Using variables to gather server info
- ❖ roles and includes
- ❖ create a role to install apache

- Ansible galaxy and how its used
- Using multiple roles
- What is parallelism
  - Parallelism in a playbook
- Adding windows nodes
- Setting up patch management
- Installing softwares using chocolatey
- setting repository for the custom module
- ansible-vault
- Ansible Tower
  - add data to inventory
  - run a sample task

- ❖ Other
  - ➢ Ansible Galaxy
  - ➢ AWX Project
  - ➢ Testing Strategies
  - ➢ YAML Syntax

For Ansible Tower Demo, please fill in the form from the below link

❖ https://www.ansible.com/products/tower/trial

Alternatively we can utilize AWX – open source version of Tower

Introduction to Ansible

Introduction

- ❖ What is Configuration management?
  - ➢ practices & tooling to automate the delivery and operation of infrastructure
- ❖ solutions model infrastructure, continually monitor & enforce desired configurations, and automatically remediate any unexpected changes or configuration drift
- ❖ deliver better software faster, configuration management helps lay the foundation for DevOps

Introduction

❖ Before we can deploy our software , we need to do a number of things:

➢ Add user accounts and passwords

➢ Configure security settings and privileges

➢ Install all the packages needed to run the app

➢ Customize the configuration files for each of these packages

➢ Create databases and database user accounts; load some initial data

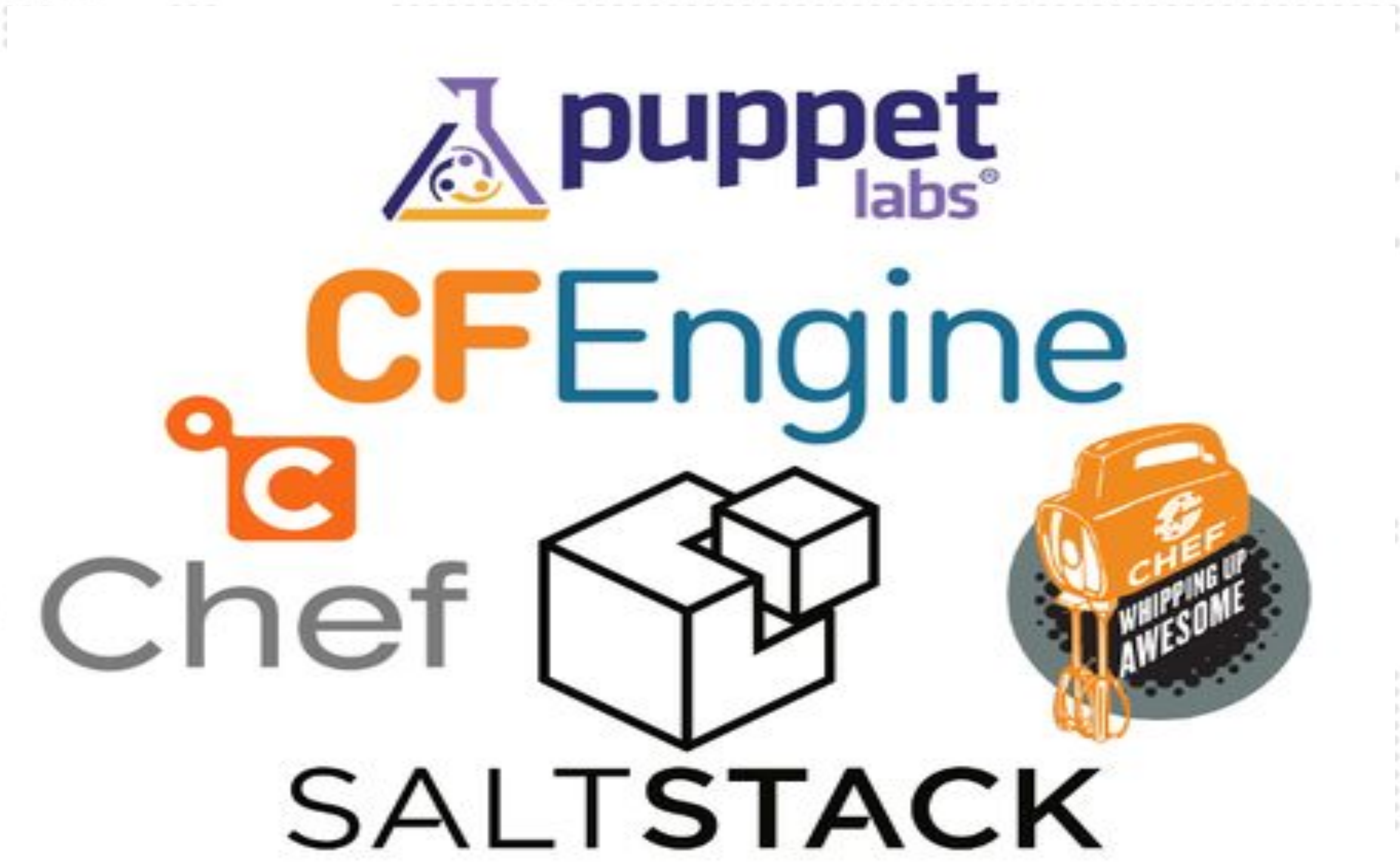
➢ Configure the services that should be running

➢ Deploy the app code and static assets

➢ Restart any affected services

➢ Configure the machine for monitoring

Introduction



Introduction

- term "ansible" was coined by Ursula K. Le Guin in 1966
  - in the novel Rocannon's World
  - refers to fictional instantaneous communication systems
- Ansible tool was developed by Michael DeHaan
  - author of the provisioning server application Cobbler
  - co-author of the Fedora Unified Network Controller (Func) framework for remote administration
- Ansible, Inc. (originally AnsibleWorks, Inc.) was the company set up to commercially support and sponsor Ansible
- Red Hat acquired Ansible in October 2015

Introduction

- included as part of the Fedora distribution of Linux, owned by Red Hat
- available for
  - Red Hat Enterprise Linux
  - CentOS
  - OpenSUSE
  - SUSE Linux Enterprise
  - Debian
  - Ubuntu
- Not available for
  - Windows

Introduction

❖ Ansible website says

➢ doing the same tasks over and over?

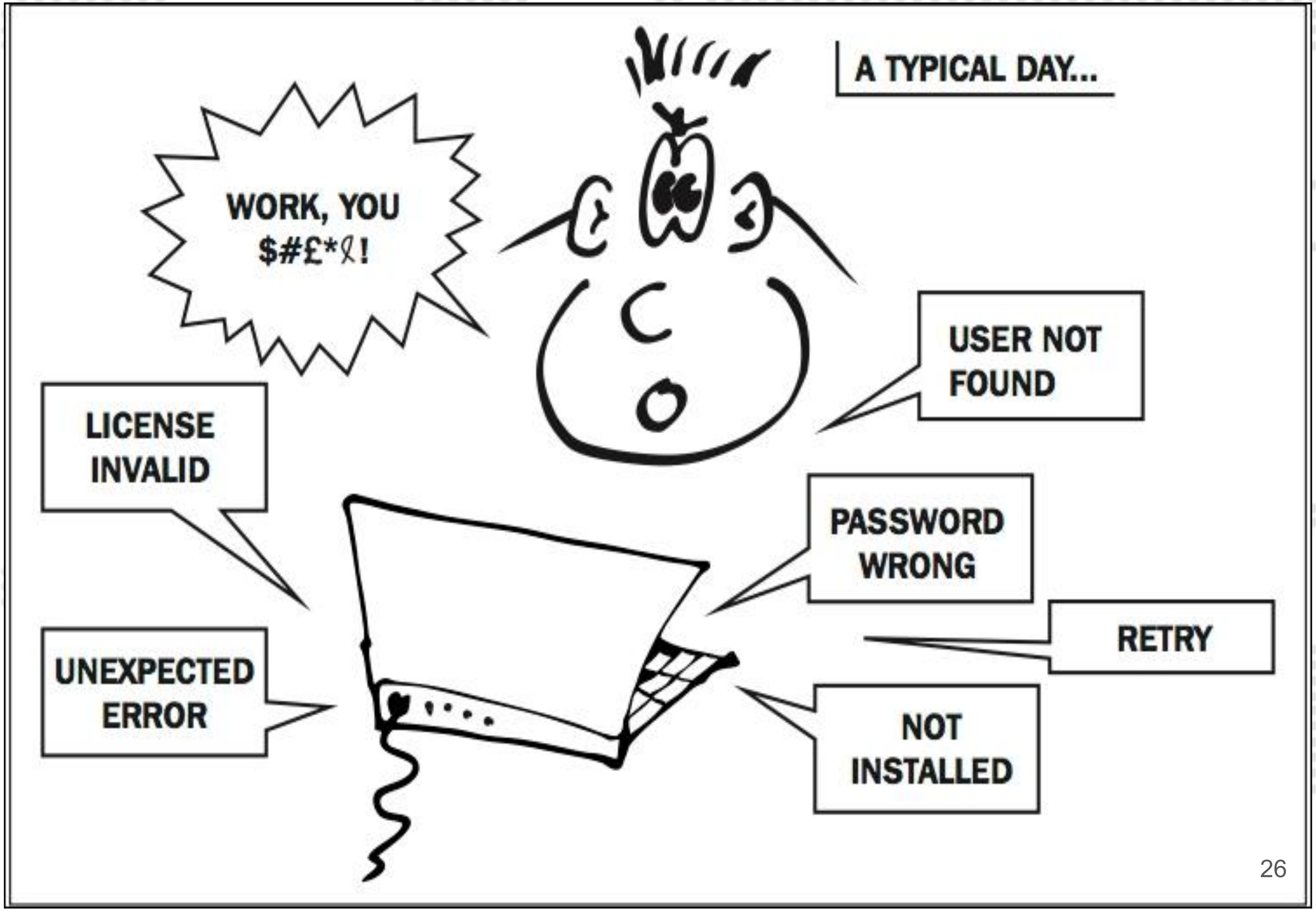
➢ solve problems once and then automate your solutions going forward?

➢ Ansible is here to help

Introduction

- What is Ansible?
  - open-source software provisioning, configuration management tool
  - runs on many Unix-like systems
  - can configure both Unix-like systems as well as Microsoft Windows
  - includes its own declarative language to describe system config
  - written by Michael DeHaan and acquired by Red Hat in 2015
  - uses push approach
  - centralized infrastructure, configuration management
  - Ansible is agentless
  - connecting remotely via SSH or remote PowerShell to do its tasks
  - acquired by redhat in October 2015

Introduction



Introduction

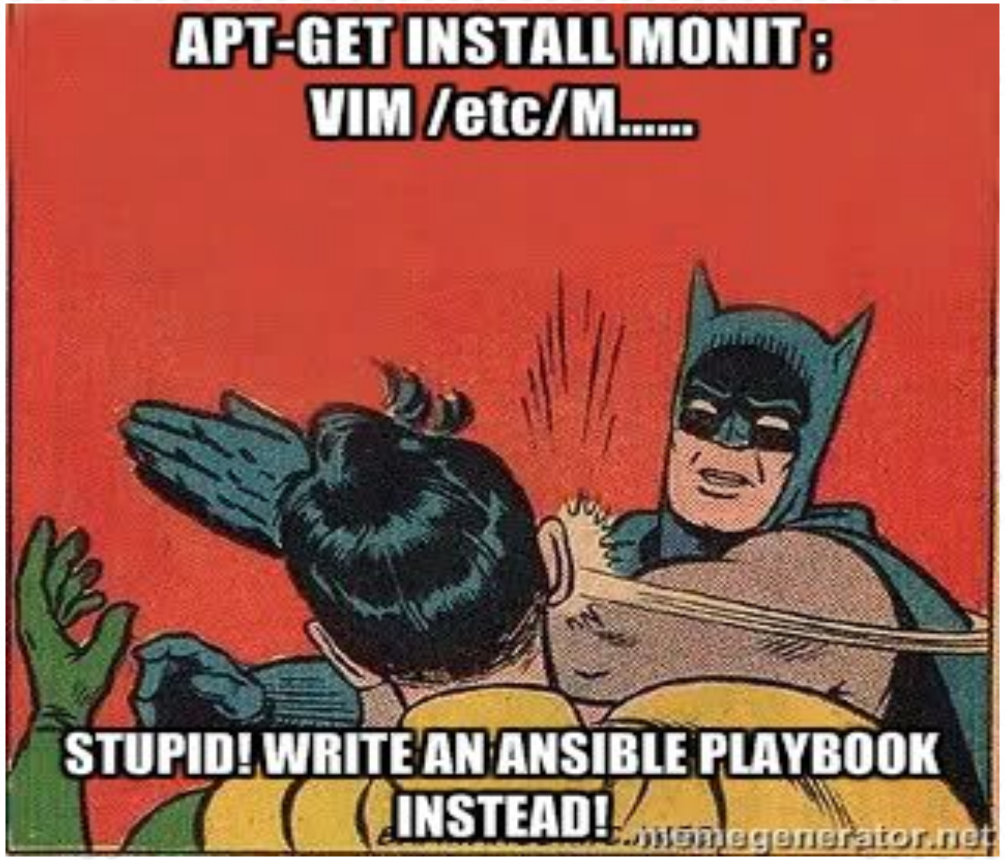
- ❖ used for
  - ➢ remote task execution
  - ➢ configuration management
  - ➢ Infrastructure as Code
  - ➢ Network deployment and management
  - ➢ hybrid cloud control

Introduction

- design goals
  - Minimal in nature
  - Consistent
  - Secure
  - Highly reliable
  - Minimal learning required

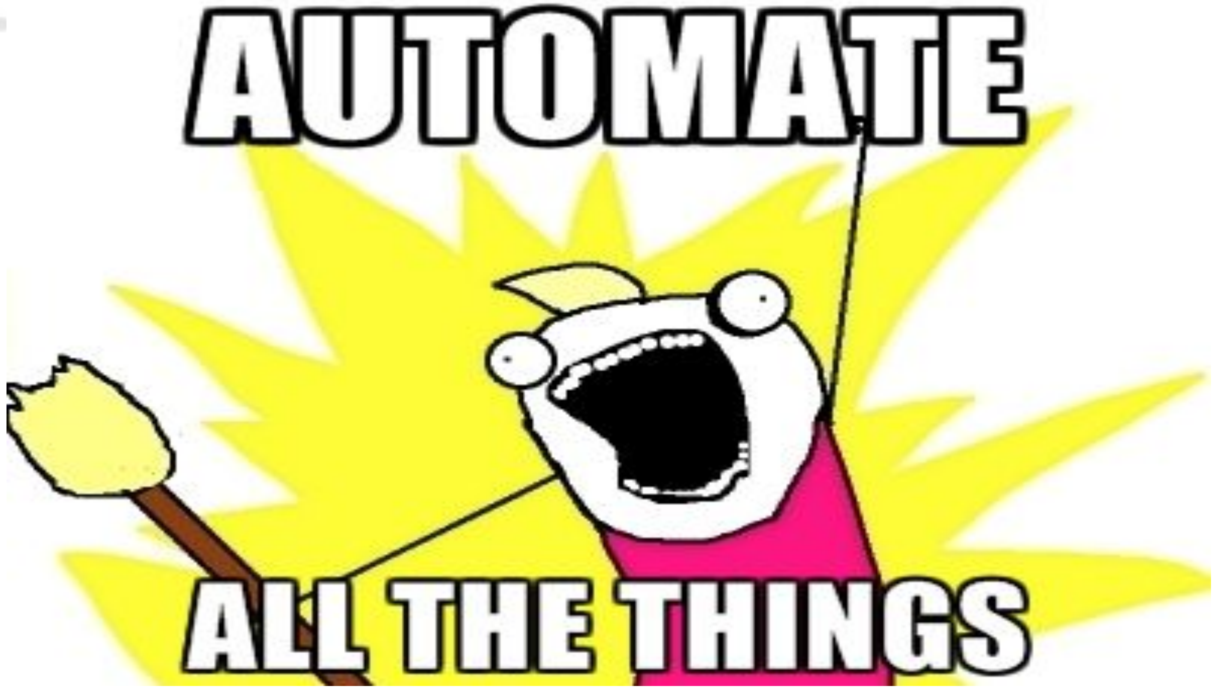
What the heck is Ansible

- ❖ software platform for CM systems
- ❖ Agent-less
- ❖ Secure
- ❖ Scalable
- ❖ Easy learning curve


APT-GET INSTALL MONIT ; VIM /etc/M.....
STUPID! WRITE AN ANSIBLE PLAYBOOK INSTEAD!
memegenerator.net

....so what can we do with ansible?

- ❖ package installation
- ❖ shell commands
- ❖ install/update package
- ❖ management systems, clone git
- ❖ stop, start, restart service etc.



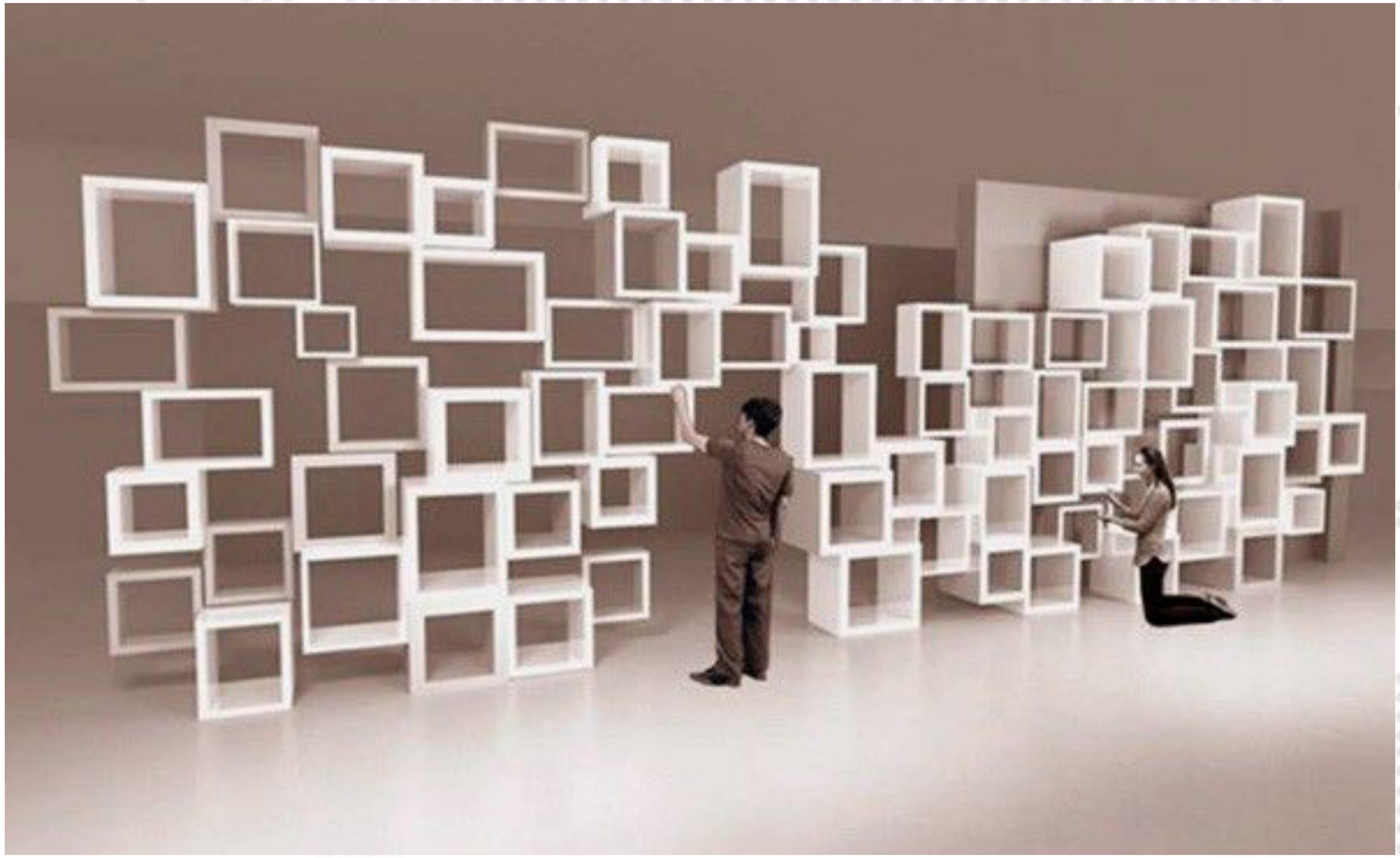
ansible comes with batteries included!!

- ❖ Ansible comes bundled with nearly all the mostly used applications/protocols etc in computing world
  - ➢ http://docs.ansible.com/list_of_all_modules.html

BATTERIES INCLUDED
No big whoop, but nice to know it's ready to go straight out of the box, right?
Vat19.com

...need anything out of the box??

- write down our own custom modules....and the best part...guess??



It’s free of language barriers

How Ansible Works

Wondering How Ansible works ??

- uses no agents – Ansible manages machines in an agentless manner.
- no additional custom security infrastructure – it's easy to deploy
- Uses YAML – Friendly Language(YAML, in the form of Ansible Playbooks)
- Uses OpenSSH for transport
- Highly scalable
- Idempotent

Wondering How Ansible works ??

- ❖ Ansible works by
  - ➢ connecting to the nodes
  - ➢ pushing out small programs, called "Ansible modules" to them
  - ➢ Ansible then executes these modules (over SSH by default)
  - ➢ removes them when finished
- ❖ programs are written to be resource models of the desired state of the system
- ❖ Passwords are supported
- ❖ SSH keys with ssh-agent are one of the best ways to use Ansible
- ❖ ssh vagrant@192.168.10.30 –T hostname

Why Ansible

- much easier to work with compared to the likes of Puppet, Chef etc
- does not require agents set up on individual nodes
- supports the pull architecture
- simple enough for new users
- works at high enough level to work with other tools as well

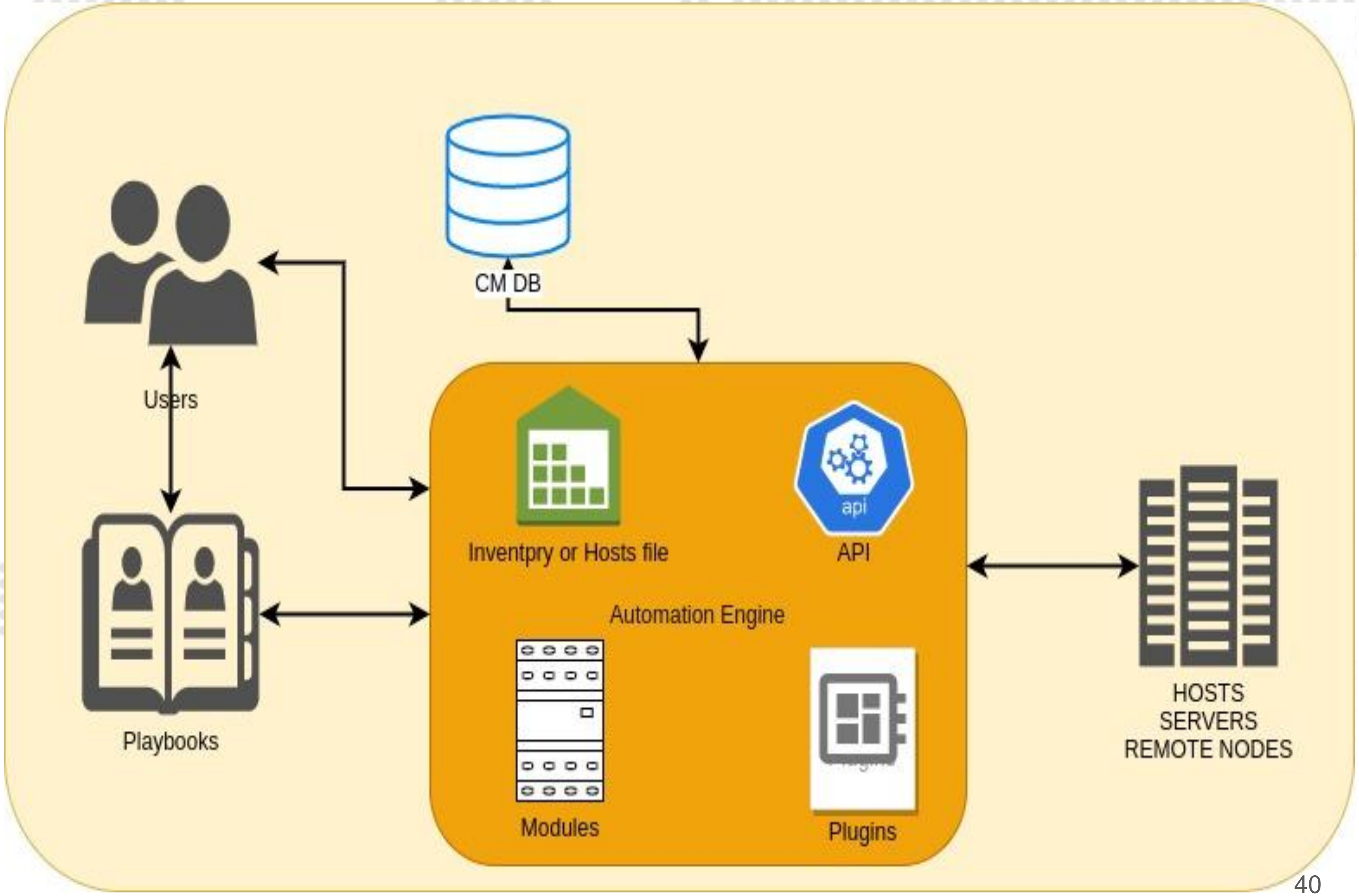
Push vs Pull

Push	Pull
● No agents required	● Agents required
● Synchronous Architecture	● Async Architecture
● Central server architecture	● Master Agent architecture

Ansible Drawbacks

- ❖ Prone to performance issues at times
- ❖ because of ssh based communication

Ansible Architecture



Ansible Architecture

- ❖ Ansible automation engine
  - ➢ inventory file
  - ➢ playbooks
  - ➢ modules
  - ➢ API's
  - ➢ plugins

Terminologies

- Control Machine / Node
  - system where Ansible is installed and configured
  - ansible connects to remote nodes and execute commands on them
- Managed Nodes/Remote Nodes/Remote Servers
  - a server controlled by Ansible
- Inventory File
  - file that contains information about the servers Ansible controls
  - located at /etc/ansible/hosts
- Playbook
  - file containing a series of tasks to be executed on a remote server

Terminologies

- Role
  - collection of playbooks and other files that are relevant to a goal such as installing a web server
- Play
  - a full Ansible run
  - can have several playbooks and roles, included
  - a single playbook can act as an entry point for other playbooks
- Playbooks
  - collection of tasks, written in yaml syntax with .yml extension
- tasks
  - uses ansible modules to accomplish the job(eg: creating a file)

Terminologies

- templates
  - file which contains all configuration parameters
  - dynamic values are given as variables
  - During playbook execution, depending on conditions like which OS we are using, variables gets replaced with relevant values
- modules
  - executed on remote nodes via tasks on directly invoked from the CLI
  - uses python interpreter and implements some functionality
- hosts
  - remote machines or nodes, defined in the inventory files

Terminologies

- groups
  - set of hosts performing a specific business goal
  - eg: webserver groups, db groups

Ansible vs Salt

Ansible	**Salt**
Python	Python
Master Less	Master Minion
SSH Based	Commands are issued on the master command line
Stateless	Maintains State

Set up learning environment

Learning Environment

- developers and engineers, often aim for minimalism and modularity
- minimalism and modularity overlooked in local development
- dependencies and tools needed to complete our job
- dependencies quickly grow in size and spiral into disrepair
- conflicting versions of the same tools or programs
- never-ending OS updates – issues
- with virtual machines – little-to-no risk to our development machine
- vagrant – takes care of all VM configurations via a Vagrantfile
- different directory for different Vagrantfile
  - directories defines the environment boundaries in Vagrant

Learning Environment

- Check if our base/physical system supports virtualization:
  - cat /etc/cpuinfo | grep –i vmx #no output for virtual machines
- already installed VirtualBox from Ubuntu or Debian repository?
- remove it with:
  - sudo apt remove virtualbox* –y
- Windows?Download the latest virtualbox from the link below:
  - https://www.virtualbox.org/wiki/Linux_Downloads
- Download the vagrant tool from the link below
  - https://www.vagrantup.com/downloads.html

Learning Environment

- Working on Windows?
  - Ensure Hyper-V is disabled
  - Download the latest virtualbox from the link below:
    - https://www.virtualbox.org/wiki/Linux_Downloads
  - Download the vagrant tool from the link below
    - https://www.vagrantup.com/downloads.html

Learning Environment

- Now install both the .deb packages using the below commands
  - sudo dpkg –i <VIRTUAL BOX FILE NAME>
  - sudo dpkg –i <VAGRANT PACKAGE NAME>
- Now create a directory as a non-root user on the Desktop
  - mkdir ~/Desktop/ansible
  - cd ~/Desktop/ansible
- Vagrant uses a config file – Vagrantfile for it's environment
- Create the file Vagrantfile in the directory
  - ~/Desktop/ansible
- Check the synced_folder location in the Vagrantfile

Learning Environment

- ❖ To turn our VM on, navigate to the directory with our Vagrantfile
  - ➢ vagrant up
  - ➢ vagrant up ansiblem
- ❖ To pause our VM, navigate to the directory with our Vagrantfile
  - ➢ vagrant suspend
  - ➢ vagrant suspend ansiblem
- ❖ To turn our VM off, navigate to the directory with our Vagrantfile
  - ➢ vagrant halt
  - ➢ vagrant halt ansiblem

Learning Environment

- Destroy our VM, navigate to the directory with our Vagrantfile:
  - vagrant destroy
  - vagrant destroy ansibleM
- Possible vm images
  - ansibleM.vm.box = "ubuntu/xenial64"
  - ansibleM.vm.box = "centos/7"
- Install a good text editor like Sublime 3
- Have a good SSH client like MobaXterm

Learning Environment

- Logging to the VM’s
  - Go to the directory where you have the Vagrant file
    - cd ~/Desktop/ansible
    - vagrant ssh ansiblem
  - Verify your IP Address with the below command
    - ip a
  - Alternatively you can also use normal ssh from any location
    - ssh vagrant@192.168.10.70
      - password is vagrant

Learning Environment

- ❖ Enable bash completion
  - ➢ sudo apt update
  - ➢ sudo apt install bash-completion -y
  - ➢ cat /etc/profile.d/bash_completion.sh
  - ➢ echo "source /etc/profile.d/bash_completion.sh" >> ~/.bashrc
  - ➢ exit
  - ➢ sudo su

Learning Environment

- Windows machine
  - Use the Vagrantfile provided for this
  - Create a folder on the desktop with name windows
  - Put the Vagrantfile referencing windows in this directory
  - now from powershell go to this windows directory and hit
    - vagrant up

Ansible Installation

Ansible Installation

- Dependencies
  - sshpass
  - python
  - openssl
- Commands for Ansible Installation
  - sudo apt update
  - sudo apt install software-properties-common sshpass -y
  - sudo apt-add-repository --yes --update ppa:ansible/ansible
  - sudo apt install ansible openssh-server -y
  - ansible --version

Ansible Configuration

- configuration files
  - /etc/ansible/ansible.cfg
- default inventory file
  - /etc/ansible/hosts

Ansible Configuration

- ❖ Inventory file location
  - ➢ vim /etc/ansible/hosts
- ❖ Ansible configuration file location
  - ➢ vim /etc/ansible/ansible.cfg
- ❖ Disabling strict host key checking
  - ➢ vim /etc/ansible/ansible.cfg

```
# uncomment this to disable SSH key host checking

host_key_checking = False
```

Ansible Configuration Parameters

- hostname
  - the hostname of the remote machine
- ansible_ssh_host
  - the ip or domain of the remote host
- ansible_port
  - the port of the remote host which is usually 22
- ansible_connection
  - the connection where we set, we want to connect with ssh
- ansible_user
  - the ssh user

Ansible Configuration Parameters

- ❖ ansible_ssh_extra_args
  - ➢ extra arguments what we want to specify for the ssh

Ansible Modules

- ❖ units which gets the work done
- ❖ works like:
  - ➢ creating file
  - ➢ setting cron jobs
  - ➢ issuing shell commands
  - ➢ executing remote scripts
  - ➢ tar/untar files
  - ➢ unzip operations
  - ➢ package installations etc.
- ❖ Ansible has built in module library for day to day use cases

Ansible Module Examples

- file
- cron
- shell
- command
- script
- copy
- template
- unarchive
- lineinfile
- user
- group

Ansible Modules

- ❖ List of available Ansible Modules
  - ➢ https://docs.ansible.com/ansible/latest/modules/modules_by_category.html

Ansible Ad Hoc Commands

❖ Ansible Ad-Hoc commands are used to accomplish tasks quickly

❖ These commands are mostly used for one-off tasks

❖ Ad-Hoc commands are handy to get small tasks done quickly

Ansible Ad Hoc Commands

- ansible –m ping all
- ansible –m ping all –u vagrant –k –K
- ansible –m ping web
- ansible –m ping web –u vagrant –k –K
- ansible –m shell all –a whoami –u vagrant –k –K
- ansible –bm shell all –a whoami –u vagrant –k –K
- ansible –m command all –a whoami –u vagrant –k –K
- ansible –b –m user –a 'name=admin' db –u vagrant –k –K
- ansible –b –m apt –a 'name=tree' web –u vagrant –k –K
- ansible –b –m apt –a 'name=nginx' web –u vagrant –k –K
- ansible –b –m service –a 'name=nginx state=started' all –u vagrant –k –K

Exercises

- Try to create the below tasks
  - Create a user with your name and verify it
  - Create a directory
  - Create a file
  - Install a package tree
  - Execute a remote command
  - Stop Nginx and verify from the server

Solution

- Create a user with your name and verify it
  - ansible –bm user all –u vagrant –K –k –a 'name=admin shell=/bin/bash'
- Create a directory
  - ansible –bm file all –u vagrant –K –k –a 'path=/tmp/dir state=directory'
- Create a file
  - ansible –bm file all –u vagrant –K –k –a 'path=/tmp/dir/myfile state=touch'
- Install a package tree
  - ansible –bm package all –u vagrant –K –k –a 'name=tree state=present'
- Execute a remote command
  - ansible –bm command all –a uptime –u vagrant –k –K

Solution

- Stop Nginx
  - ansible –b –m service –a ‘name=nginx state=started’ all –u vagrant –k –K

Break

YAML Introduction

YAML Syntax

- YAML Ain’t Markup Language
- More human readable than XML or JSON
- Parsers are commonly available (yaml-lint)
- Ansible uses a subset of YAML in a specific way
- All documents begin with ---
- Ansible: only one YAML document per file (the YAML spec allows more)
- *almost* all Ansible YAML files start with a list (- [key])
- Indentation is key
- .yml or .yaml extension

YAML Syntax

- Primary elements are
  - Lists
  - Hashes
  - Booleans

YAML Example

```
---
# This Playbook would deploy the whole mongodb cluster with replication and
sharding.
- hosts: all
  roles:
    - role: common
- hosts: mongo_servers
  roles:
    - role: mongod
- hosts: mongoc_servers
  roles:
     - role: mongoc
- hosts: mongos_servers
  roles:
    - role: mongos
- hosts: mongo_servers
tasks:
- include: roles/mongod/tasks/shards.yml
```

Lists

- A series of values
- Can be long

```
---
mylist:
- item1
- item2
- item3
```

- or short form

```
---
mylist: ['item1' ,'item2', 'item3']
```

Hash or Dictionary

- Key-Value pairs
- Can be long

```
---
employees:
- dave:
  name: Davey Jones
  job: Sailor
  location: In locker
```

- or short form

```
---
employees:
  - dave: {name: Davey Jones, job: Sailor, location: In locker}
```

Yaml Lint

- syntax checker for yaml
- Simple to install
- Easy to use
- light-weight alternative to the Ansible parser
- Installation
  - sudo apt-get install yamllint
- Usage
  - yamllint myplaybook.yml

Yaml Exercise

- touch abc.yml
- yamllint abc.yml
- echo 'Demo YAML' > abc.yml
- yamllint abc.yml

That's All for Day 1

Inventory File

Inventory Files

- Inventory file for ansible can be located on this location
  - /etc/ansible/hosts
- Rules of this hosts file
  - Comments begin with the '#' character
  - Blank lines are ignored
  - Groups of hosts are delimited by [header] elements
  - we can enter hostnames or ip addresses
  - hostname/ip can be a member of multiple groups

Inventory Files

- Individual hosts, Ungrouped hosts, specify before any group headers

```
green.example.com

blue.example.com

192.168.100.1

192.168.100.10
```

- Grouping of hosts – collection of hosts belonging to the 'webservers' group

```
[webservers]

alpha.example.org

beta.example.org

192.168.1.100

192.168.1.110
```

Inventory Files

- have multiple hosts following a pattern? specify them like this

```
www[001:006].example.com
db-[99:101]-node.example.com
```

- A collection of database servers in the 'dbservers' group

```
[dbservers]
db01.intranet.mydomain.net
db02.intranet.mydomain.net
10.25.1.56
10.25.1.57
```

Inventory Files

❖ Group of Groups

```
[childgroup2]
host1
host2

[childgroup1]
host2
host3

[parent1:children]
childgroup1
childgroup2
```

More Examples Inventory Files

```
[web]
mastery.example.name ansible_host=192.168.10.25

[dns]
backend.example.name

[database]
backend.example.name

[frontend:children]
web

[backend:children]
dns
database

[web:vars]
http_port=88
proxy_timeout=5

[backend:vars]
ansible_port=314

[all:vars]
ansible_ssh_user=otto
```

Dynamic Inventory

- ❖ Ansible inventory fluctuates over time?
- ❖ hosts spinning up and shutting down in response to business demands?
- ❖ /etc/ansible/hosts – static inventory will not serve our needs in this case
- ❖ tracking hosts from multiple sources?
  - ➢ cloud providers
  - ➢ LDAP
  - ➢ Cobbler
  - ➢ enterprise CMDB systems
- ❖ Ansible integrates to all of these via a dynamic external inventory system

Dynamic Inventory

- Ansible supports two ways to connect with external inventory
  - Inventory Plugins
    - can be enabled from the ansible.cfg file
    - aws_ec2, openstack etc.
  - inventory scripts
- plugins recommended over scripts for dynamic inventory
- ok to write our own plugin to connect to other dynamic inventory sources

Dynamic Inventory

- Ansible supports two ways to connect with external inventory
  - Inventory Plugins
    - can be enabled from the ansible.cfg file
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  - inventory scripts
- plugins recommended over scripts for dynamic inventory
- ok to write our own plugin to connect to other dynamic inventory sources

Dynamic Inventory

- When ansible or ansible-playbook is directed at an executable file for an inventory source, Ansible will execute that script with a single argument, --list
- allows Ansible to get a listing of the entire inventory in order to build up its internal objects to represent the data
- Once that data is built up, Ansible will then execute the script with a different argument for every host in the data to discover variable data
- The argument used in this execution is --host <hostname>, which will return any variable data specific to that host

Dynamic Inventory

- ❖ Cobbler
  - ➢ https://github.com/hellodk/ansible-provider-docs/tree/master/contrib/inventory
  - ➢ copy cobbler.py to /etc/ansible and chmod +x the file
  - ➢ Run cobblerd any time we use Ansible
  - ➢ to communicate with Cobbler using Cobbler's XMLRPC API use the –i command line option
    - ansible-playbook –i /etc/ansible/cobbler.py .....
  - ➢ Add a cobbler.ini file in /etc/ansible so Ansible knows where the Cobbler server is and some cache improvements can be used

Dynamic Inventory

- /etc/ansible/cobbler.ini

```
[cobbler]

# Set Cobbler's hostname or IP address

host = http://127.0.0.1/cobbler_api

cache_path = /tmp

cache_max_age = 900
```

- EC2
  - ➢ `ansible -i ec2.py -u ubuntu us-east-1d -m ping`
- References
  - ➢ https://docs.ansible.com/ansible/latest/user_guide/intro_dynamic_inventory.html

Dynamic Inventory

- Custom Scripts
  - python3 get_inventory.py
- Ensure get_inventory.py is executable
  - cp get_inventory.py /home/vagrant
  - cd /home/vagrant
  - chmod +x get_inventory.py
  - ls –ltr
- Run ansible and pass this dynamic inventory
  - ansible all –i get_inventory.py –m ping –k –K

Inventory Exercises

- ❖ Add your servers in inventory with the below specifications
  - ➢ [main] group comprising of anisblem
  - ➢ [slaves] group comprising of ansibles1, ansibles2, ansibles3
  - ➢ [windows] group with ip 192.168.10.35 (we will use it later)

Inventory Exercises Solution

❖ Add your servers in inventory with the below specifications

➢ [main] group comprising of anisblem

```
[main]

192.168.10.30
```

➢ [slaves] group comprising of ansibles1, ansibles2, ansibles3

```
[slaves]
192.168.10.30
192.168.10.30
192.168.10.30
```

➢ [windows] group with ip 192.168.10.35 (we will use it later)

```
[windows]

192.168.10.30
```

Introduction to Tasks and Playbooks

Tasks

- ❖ Individual piece of a job
- ❖ Example
  - ➢ creating a file
  - ➢ starting a service etc.
- ❖ 2 ways to implement tasks
- ❖ to create a user:
  - ➢ ansible –b –K –m user –a ‘name=admin’ db –u vagrant –k –K

    or

  - ➢
    ```
    – name: Add the user 'admin’ # This is the title
      user: # This is the module name
        name: admin # These are the list of supported parameters
    ```

Playbooks

❖ A collection of tasks along with host definitions

```
---
- hosts: 192.168.122.196
  become: yes
  remote_user: vagrant
  tasks:

   - name: "Create demo group"
     group:
       name="demo"
       state="present"
```

Executing Playbooks

- ❖ Syntax
    - ➢ ansible-playbook <playbook name>
- ❖ Creating a group
    - ➢ ansible-playbook create_group.yml
- ❖ Creating a user
    - ➢ ansible-playbook create_user.yml
- ❖ Create a file
    - ➢ ansible-playbook create_file.yml
- ❖ Create a directory
    - ➢ ansible-playbook create_directory.yml

Executing Playbooks with Verbosity

- Verbosity levels
  - v
  - vv
  - vvv
  - vvvv
- Create a directory
  - ansible-playbook create_directory.yml -v
  - ansible-playbook create_directory.yml -vv
  - ansible-playbook create_directory.yml -vvv
  - ansible-playbook create_directory.yml -vvvv

Including Playbooks

❖ Include multiple plays into a single playbook

➢ ansible-playbook all.yml

➢ ansible-playbook all.yml -v

Problem with this Playbook

- Issues
  - Fixed group name
  - Fixed host name
- Solution
  - Variables

Variables in Ansible

Variables

- May be defined through:
  - Playbooks
  - External YAML
  - Facter
  - Command line
  - Host and Group directories
- Must only consist of:
  - letters
  - numbers
  - underscores

Variables in Inventory Files

- cat /etc/ansible/hosts

```
[webservers]

web-01 http_port=80 maxRequests=200

web-02 http_port=80 maxRequests=200

[webservers:vars]

ntp_server=0.centos.pool.ntp.org

proxy=webproxy
```

Variables in Facter

- ansible all –m setup

```
host-10-23-5-21 | SUCCESS => {
"ansible_facts": {
"ansible_all_ipv4_addresses": [
"10.23.5.21"
],
"ansible_all_ipv6_addresses": [
"fe80::f816:3eff:fef7:6e80"
],
"ansible_architecture": "x86_64",
```

Variables in Playbook

```
- name: Deploy our webservers

  hosts: webservers

  vars:

  http_port: 80

  tasks:

  - name: deploy apache
```

Variables in External YAML

```
# The Playbook
---
- name: Deploy our webservers
hosts: webservers
vars:
http_port: 80
vars_files: /vars/external_vars.yml
tasks:
- name: deploy apache
```

Variables in External YAML

```
# The YAML file
---
myvariable1: myvalue1
myvariable2: myvalue2
foo:
subkey1: one
subkey2: two
```

Variables in Modules in External File

```
# The Playbook

---

- name: Deploy our webservers

hosts: webservers

tasks:

- name: include default step variables

  include_vars: default_step.yml
```

Variables in Modules in External File

```
# The YAML file

---

myvariable1: myvalue1

myvariable2: myvalue2

foo:

 subkey1: one

 subkey2: two
```

Variables in split-out yaml/json files

- /etc/ansible/host_vars
- /etc/ansible/group_vars

Variables in Command line

-
  ```
  ansible-playbook release.yml --extra-vars "version=1.23.45
  other_variable=foo"
  ```

-
  ```
  ansible-playbook release.yml --extra-vars
  '{"pacman":"mrs","ghosts":["inky","pinky", "clyde","sue"]}
  ```

-
  ```
  ansible-playbook release.yml --extra-vars "@some_file.json"
  ```
- In any section, redefining a variable will overwrite the previous instance
- If multiple groups have the same variable, the last one loaded wins

Using Variables in Playbooks

```
tasks:

– debug: msg="System {{ inventory_hostname }} has gateway {{

ansible_default_ipv4.gateway }}"

when: ansible_default_ipv4.gateway is defined

– name: Deploy my file

template: src=foo.cfg.j2 dest={{ remote_install_path }}/foo.cfg
```

Using Variables in Templates

```
Port {{ ssh_port }}
Protocol {{ ssh_protocol }}
HostKey /etc/ssh/ssh_host_rsa_key
HostKey /etc/ssh/ssh_host_dsa_key
UsePrivilegeSeparation yes
KeyRegenerationInterval 3600
ServerKeyBits 1024
SyslogFacility AUTH
LogLevel INFO
LoginGraceTime 120
PermitRootLogin {{ ssh_permit_root_login }}
StrictModes yes
...
```

Flexible Playbook with variables

- copy the previous file into a new file – flexible-playbook.yaml

```
---
- name: My playbook
  hosts: '{{ hosts }}'
  remote_user: '{{ user }}'
  tasks:.....
```

- Execution command
  - ansible-playbook flexible-playbook.yaml --extra-vars "hosts=web user=vagrant"

Variable Scopes

- determines where the variable is valid
- 3 main scopes
  - Global
    - Set by config, environment variables and the command line
  - Play
    - Each play and its contained structures, vars entries, include_vars, role defaults and vars
  - Host
    - Variables directly associated to a host
    - eg: inventory, facts or registered task outputs

Variable Scopes

- Nested data structures are accessed slightly differently:
  - `{{ ansible_eth0["ipv4"]["address"] }}`

    OR alternatively:
  - `{{ ansible_eth0.ipv4.address }}`
- To access the first element of an array:
  - `{{ foo[0] }}`

Variable Precedence

- role defaults (least important)
- inventory vars [2]
- inventory group_vars
- inventory host_vars
- playbook group_vars
- playbook host_vars
- host facts
- registered vars
- set_facts
- play vars

Variable Precedence

- play vars_prompt
- play vars_files
- role and include vars
- block vars (only for tasks in block)
- task vars (only for the task)
- extra vars (most important)

Splitting out Variables

- ❖ Host and Group variables can be stored in individual files relative to inventory file
  - ➢ host_vars
  - ➢ group_vars
- ❖ ls /etc/ansible/host_vars
  - ➢ webserver1.yaml
  - ➢ webserver2.yaml
- ❖ ls /etc/ansible/group_vars
  - ➢ dbservers.yaml
  - ➢ webservers.yaml
  - ➢ all_infrastructure.yaml

Splitting out Variables

- You can also create directories named after your groups or hosts.
- All files in the directories will be read
  - /etc/ansible/group_vars/webserver/db_settings
  - /etc/ansible/group_vars/webserver/cluster_settings
- the group_vars/ and host_vars/ directories can exist in either the playbook directory OR the inventory directory
- If both paths exist, variables in the playbook directory will override variables set in the inventory directory

Splitting out Variables

- ❖ All group variables must be defined in a group_vars area
- ❖ All host variables must be defined in a host_vars area

Exercises

- Have an entry like this in your inventory file

```
[web]

192.168.10.71
```

- ansible web –m ping
- ansible web –m command –a "uptime" –o
- ansible web –m setup
- sudo yum list available subversion.x86_64 ––showduplicates
- ansible web –m package –a "name=subversion–1.7.14–11.el7_4 state=present" –b
- ansible web –m package –a "name=subversion state=latest" –b
- ansible web –m package –a "name=* state=latest" –b
- ansible web –m yum –a "name=* security=yes state=latest" –b

Exercises

- ansible web -m package -a "name=rh-maven35 state=present" -b
- ansible web -m package -a "name=git state=present" -b
- ansible web -m package -a "name=@jboss-eap7 state=present" -b
- ansible web -m service -a "name=eap7-standalone state=started" -b
- ansible web -m git -a

  "repo=https://github.com/jboss-developer/jboss-eap-quickstarts.git

  dest=/tmp/checkout"
- ansible web -m shell -a "scl enable rh-maven35 'mvn clean install wildfly:deploy

  -Dmaven.test.skip=true' chdir=/tmp/checkout/helloworld" -b
- ansible web -m uri -a "url=http://localhost:8080/helloworld/

  return_content=yes"

Exercises

- Demo site (open this in your web browser):
  - http://192.168.10.70:8080/helloworld/
- ansible web -m service -a "name=eap7-standalone state=stopped" -b
- ansible web -m package -a "name=@jboss-eap7 state=absent" -b
- ansible web -m package -a "name=eap7-* state=absent" -b
- ansible web -m package -a "name=rh-maven35 state=absent" -b
- ansible web -m package -a "name=git state=absent" -b

Exercises

- ❖ Execute the playbook
  - ➢ playbook1.yaml

Prompt

```
---
- hosts: all
  remote_user: vagrant

  vars_prompt:
      - name: "name"
      prompt: "what is your name?"

      - name: "quest"
      prompt: "what is your quest?"

      - name: "favcolor"
      prompt: "what is your favorite color?"
```

Playbook Exercises

- write a playbook to accomplish the following tasks with user input, group input and host name input
  - Create a user with name admin, group admin
  - Create a folder
    - mydir
  - Create a file
    - myfile
  - Create a symlink to the file myfile
    - mysymlink
  - Copy a file from your local system to the directory mydir

Variable Exercises

- Write a playbook to print all the variables
- Write a playbook to create a user where user is a variable
- Write a playbook to prompt user for details

Variable Exercises Solution

- Write a playbook to print all the variables
  - ansible-playbook debug_module_usage.yml
- Write a playbook to create a user where user is a variable
  - ansible-playbook create_user.yml
- Write a playbook to prompt user for details
  - ansible-playbook vars_prompt.yml

SSH Based Authentication

- Generate ssh keys if not already present
  - ssh-keygen
  - ls -ltr ~/.ssh
- copy the public keys of your centralized server
  - cat /home/vagrant/.ssh/id_rsa.pub
- put the same public keys in the authorized keys of the remote machines
  - vim /home/vagrant/.ssh/authorized_keys
- verify the same by doing a ssh from the central machine to the remote
  - ssh vagrant@192.168.10.31
- You should be able to connect automatically without password

SSH Based Authentication Exercise

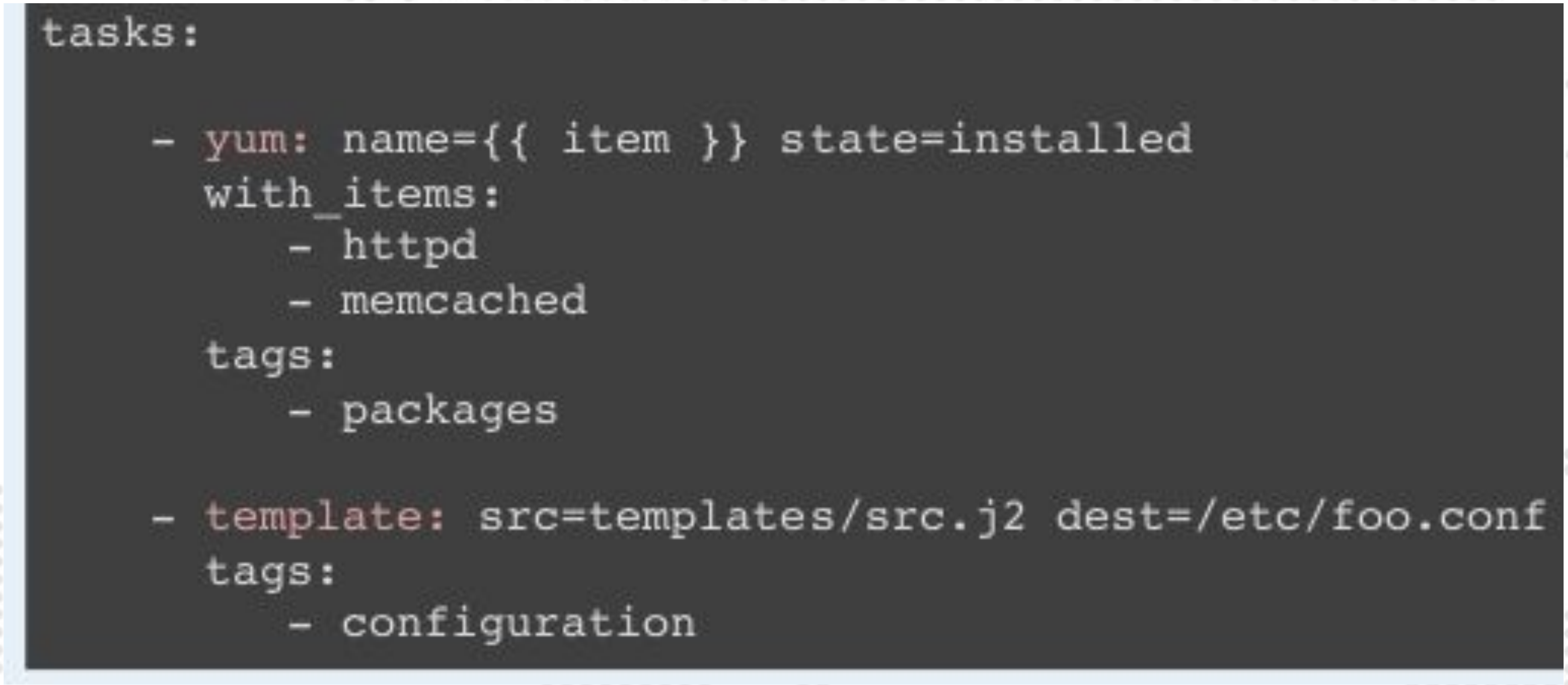
- copy the public keys of your centralized server to all the remote servers
  - source: /home/vagrant/.ssh/id_rsa.pub
  - destination: /home/vagrant/.ssh/authorized_keys
- verify the same by doing a ssh from the central machine to the remote
  - ssh vagrant@192.168.10.30
  - ssh vagrant@192.168.10.31
  - ssh vagrant@192.168.10.32
  - ssh vagrant@192.168.10.33
- You should be able to connect automatically without password

SSH Based Authentication Solution

- copy the public keys of your centralized server to all the remote servers
  - source: /home/vagrant/.ssh/id_rsa.pub
  - destination: /home/vagrant/.ssh/authorized_keys
    - ansible-playbook generate_ssh_keys.yml
- verify the same by doing a ssh from the central machine to the remote
  - ssh vagrant@192.168.10.30
  - ssh vagrant@192.168.10.31
  - ssh vagrant@192.168.10.32
  - ssh vagrant@192.168.10.33
- You should be able to connect automatically without password

Controlling Play Execution

Tags



```
tasks:

    - yum: name={{ item }} state=installed
      with_items:
          - httpd
          - memcached
      tags:
          - packages

    - template: src=templates/src.j2 dest=/etc/foo.conf
      tags:
          - configuration
```

Tags

- `ansible-playbook playbook1.yml --tags "configuration,packages"`
- `ansible-playbook playbook1.yml --skip-tags "notification"`
- `ansible-playbook playbook1.yml --step`
- `ansible-playbook playbook1.yml --check`

Play Information

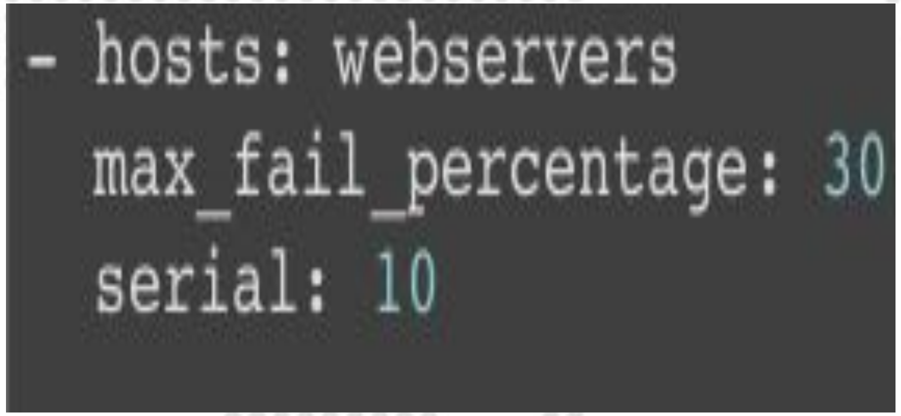
- list all tasks that would be executed by a play without making changes
  - ansible-playbook playbook1.yml --list-tasks
- list all hosts that would be affected by a play, without running any tasks
  - ansible-playbook playbook1.yml --list-hosts
- use tags to limit the execution of a play
  - ansible-playbook playbook1.yml --list-tags

Controlling Play Execution

- use option --start-at-task to define a new entry point for our playbook
- Ansible will skip anything that comes before the specified task
- requires a valid task name as argument:
  - ansible-playbook playbook1.yml --start-at-task="Set Up Nginx"
- only execute tasks associated with specific tags, use the option --tags
  - ansible-playbook playbook1.yml --tags=mysql,nginx
- skip all tasks that are under specific tags, use --skip-tags
  - ansible-playbook playbook1.yml --skip-tags=mysql

Maximum Failure Percentage

- By default, Ansible will continue executing actions as long as there are hosts in the group that have not yet failed
- For situations such as rolling updates, it may be desirable to abort the play when a certain threshold of failures have been reached
- We do this with "max_fail_percentage"



```
- hosts: webservers
  max_fail_percentage: 30
  serial: 10
```

Delegation

- ❖ want to perform a task on one host with reference to other hosts?
- ❖ use the ‘delegate_to’ keyword

```
---
- hosts: webservers
  serial: 5
  tasks:
  - name: take out of load balancer pool
    command: /usr/bin/take_out_of_pool {{ inventory_hostname }}
    delegate_to: 10.0.0.65
  - name: actual steps would go here
    yum: name=acme-web-stack state=latest
  - name: add back to load balancer pool
    command: /usr/bin/add_back_to_pool {{ inventory_hostname }}
    delegate_to: 10.0.0.65
```

Localhost Delegation

- delegate to localhost
- There is a shorthand for this: "local_action"

```
---
tasks:
  - name: take out of load balancer pool
  local_action: command /usr/bin/take_out_of_pool {{ inventory_hostname }}
  - name: add back to load balancer pool
  local_action: command /usr/bin/add_back_to_pool {{ inventory_hostname }}
```

Error Handling

- Ignoring failed commands
- Ensuring Handler behaviour
- Specifying Failure States
- Aborting the Play
- Blocks

Error Handling

- Ignoring Errors

```
- name: this will not be counted as a failure
  command: /bin/false
  ignore_errors: yes
```

- Forcing handlers

```
- name: this will not be counted as a failure
  command: /bin/false
  force_handlers: True
```

- Failed in

```
- name: this command prints FAILED when it fails
  command: /usr/bin/example-command -x -y -z
  register: command_result
  failed_when: "'FAILED' in command_result.stderr"
```

Accelerated Mode

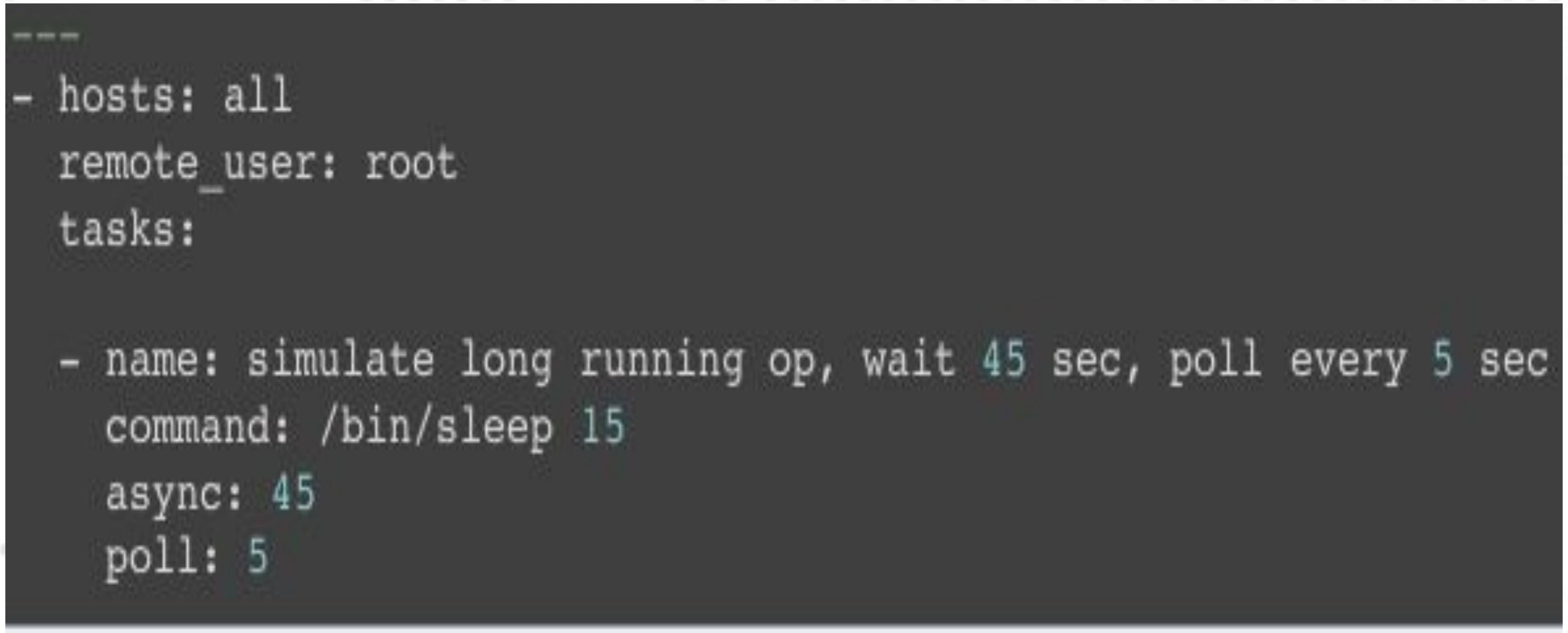
- Launches a daemon on port 5099 for 30 minutes
- Requires Python 2.5+ on the Controller
- Significantly faster than Paramiko
- In a Play:

```
- hosts: all
  accelerate: true
  tasks:
   - name: some task
```

- Options available in ansible.cfg

```
[accelerate]
accelerate_port = 5099
accelerate_timeout = 30
accelerate_connect_timeout = 5.0
accelerate_multi_key = yes
```

Asynchronous Actions



```
---
- hosts: all
  remote_user: root
  tasks:

  - name: simulate long running op, wait 45 sec, poll every 5 sec
    command: /bin/sleep 15
    async: 45
    poll: 5
```

Exercises

- Convert install_docker.sh to an Ansible playbook

That's All for Day 2

Facts in Ansible

Facts

- System information provided by "Facter"
- Gathered as a discrete step during a run
- Accessible via the "setup" module
- An extensible framework
  - Custom Facts
  - Local Facts
- Fact gathering can be disabled via the "gather_facts" setting:

  -
    ```
    - hosts: whatever
      gather_facts: no
    ```
- You may wish to do this for performance

Facts

- ansible –m setup main –a filter=*ipv4
- Display facts from all hosts and store them
  - ansible all –m setup --tree /tmp/facts
- Display only facts regarding memory
  - ansible all –m setup –a 'filter=ansible_*_mb'
- Display only facts returned by facter.
  - ansible all –m setup –a 'filter=facter_*'
- Collect only facts returned by facter
  - ansible all –m setup –a 'gather_subset=!all,facter'

Facts

- Available gather_subset are
  - all
  - min
  - hardware
  - network
  - virtual
  - ohai
  - facter

Local Facts

- ❖ Also known as "External Facts"
- ❖ Loaded from /etc/ansible/facts.d from every remote server – hence local facts
- ❖ Must end in .fact
- ❖ Must either contain JSON
- ❖ OR be executable and return JSON
- ❖ Return as part of the "ansible_local" fact
- ❖ local fact file returning JSON:
  - ➢ cat /etc/ansible/facts.d/cluster.fact

    { "state": "green", "backup": "complete" }
  - ➢ ansible –m setup –a 'filter=ansible_local' main

Filtering Facts

- want to re-read facts after deploying a new one – localfacts.yaml

```
- hosts: webservers

tasks:

- name: create directory for ansible custom facts

  file: state=directory recurse=yes path=/etc/ansible/facts.d

- name: install custom impi fact

  copy: src=ipmi.fact dest=/etc/ansible/facts.d

- name: re-read facts after adding custom fact

  setup: filter=ansible_local
```

Facts

- ❖ ansible –m setup all –l 192.168.10.30 –a "filter=ansible_python.executable"
- ❖ ansible –m setup all –a "filter=ansible_local"

Fact Caching

- allows to view Facts
  - from previous runs
  - from other Hosts
- possible for one server to reference variables about another
  - {{ hostvars['asdf.example.com']['ansible_os_family'] }}
- save facts between playbook runs
- feature must be manually enabled
- useful in very large infrastructure with thousands of hosts
- Fact caching could be configured to run nightly

Fact Caching

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  - from previous runs
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- possible for one server to reference variables about another
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- useful in very large infrastructure with thousands of hosts
- Fact caching could be configured to run nightly

Fact Caching

- Ansible ships with two persistent cache plugins
  - redis
  - jsonfile
- get redis up and running, perform the equivalent OS commands:
  - yum install redis
  - service redis start
  - pip install redis
- Redis plugin does not support port or password configuration

Fact Caching

- enable fact caching via redis by enabling it in ansible.cfg as follows:

```
[defaults]

gathering = smart

fact_caching = redis

fact_caching_timeout = 86400

# seconds
```

Fact Caching

- configure Fact Caching with a jsonfile:

```
[defaults]

gathering = smart
fact_caching = jsonfile
fact_caching_connection = /home/vagrant
fact_caching_timeout = 86400
# seconds
```

- Execute some playbooks
  - ansible-playbook local-facts.yml
  - ls -ltr ~
  - ansible -m setup all -a "filter=ansible_local"
  - ls -ltr ~

Set Facts

❖ ansible-playbook set_facts

Templating in Ansible

Jinja2 Templates

- Ansible uses the Jinja2 templating system
- All variables in-scope are available inside a template
  - ansible-playbook local-facts-template.yml
- Templates are essential for managing services that vary their configurations

Printing Variables

```
---
- hosts: 127.0.0.1
  sudo: yes
  remote_user: runuser
  tasks:
   # Example that prints the loopback address and gateway for each host
   - debug: msg="System"
   - debug: msg="System {{ inventory_hostname }} has gateway {{
ansible_default_ipv4.gateway }}"
     when: "ansible_default_ipv4.gateway is defined"
   - shell: /usr/bin/uptime
     register: result
   - debug: var=result verbosity=2
   - name: Display all variables/facts known for a host
     debug: var=hostvars[inventory_hostname] verbosity=4
```

Magic Variables

- few additional variables – cannot be set directly by the user
- Ansible will always override them to reflect internal state
  - hostvars
  - group_names
  - groups
- hostvars
  - Ask about the variables of another host
  - {{ hostvars['test.example.com']['ansible_distribution'] }}
- group_names
  - list of all the Groups the Host is in
- groups
  - list of all the Groups and their Hosts in the Inventory

Magic Variables

- Using group_names in template logic:
  - ➢ {% if 'webserver' in group_names %}

    # some part of a configuration file that only applies to webservers

    {% endif %}
- Using groups in template logic:
  - ➢ {% for host in groups['slaves'] %}

    # something that applies to all app servers.

    {% endfor %}

Magic Variables

- Finding all IP addresses in a Group:

  ➢
  ```
  {% for host in groups['slaves'] %}

  {{ hostvars[host]['ansible_eth0']['ipv4']['address'] }}

  {% endfor %}
  ```

Few more Magic Variables

- inventory_hostname: hostname as configured in Ansible's inventory file
- play_hosts: list of hostnames that are in scope for the current play
- inventory_dir: Pathname of the directory holding Ansible's inventory file
- inventory_file: pathname and the filename pointing to Ansible's inventory file

Registered Variables

- major use of variables is running a command, saving the result, and performing actions with that variable – "Registering a Variable"

```
- hosts: web_servers
  tasks:
    - shell: /usr/bin/foo
      register: foo_result
      ignore_errors: True
    - shell: /usr/bin/bar
      when: foo_result.rc == 5
```

- Registered variables have the same scope and lifetime as Facts

Exercises

- Using the Ansible debug statement print the following:
  - hostvars
  - group_names
  - groups
  - inventory_hostname
  - play_hosts
  - inventory_dir
  - inventory_file
  - role_path
- Use register to register the output of a task and print it

Exercises

- ansible-playbook template_example.yml -e "id=1"

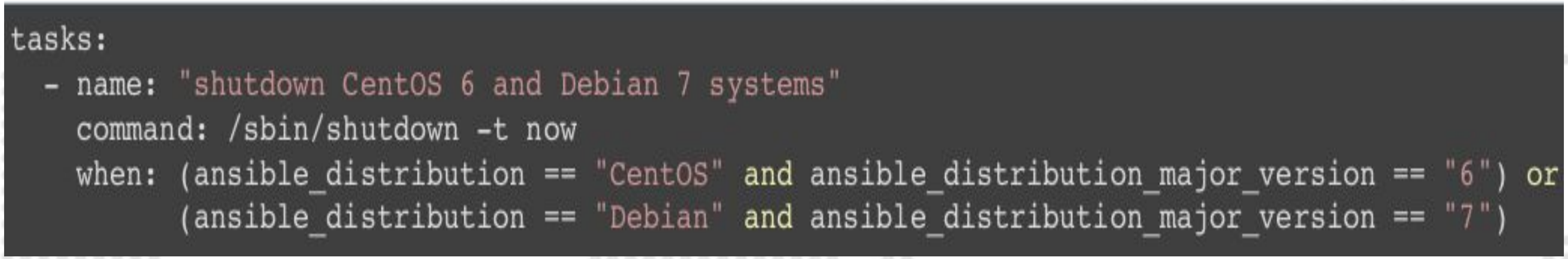
Conditionals & Filters in Ansible

Conditionals

- "when" is the conditional keyword:

```
tasks:
- name: "shutdown Debian flavored systems"
  command: /sbin/shutdown –t now
  when: ansible_os_family == "Debian”
```

- use parentheses to group conditions:



```
tasks:
  - name: "shutdown CentOS 6 and Debian 7 systems"
    command: /sbin/shutdown -t now
    when: (ansible_distribution == "CentOS" and ansible_distribution_major_version == "6") or
          (ansible_distribution == "Debian" and ansible_distribution_major_version == "7")
```

Conditionals

- Booleans can also be checked:

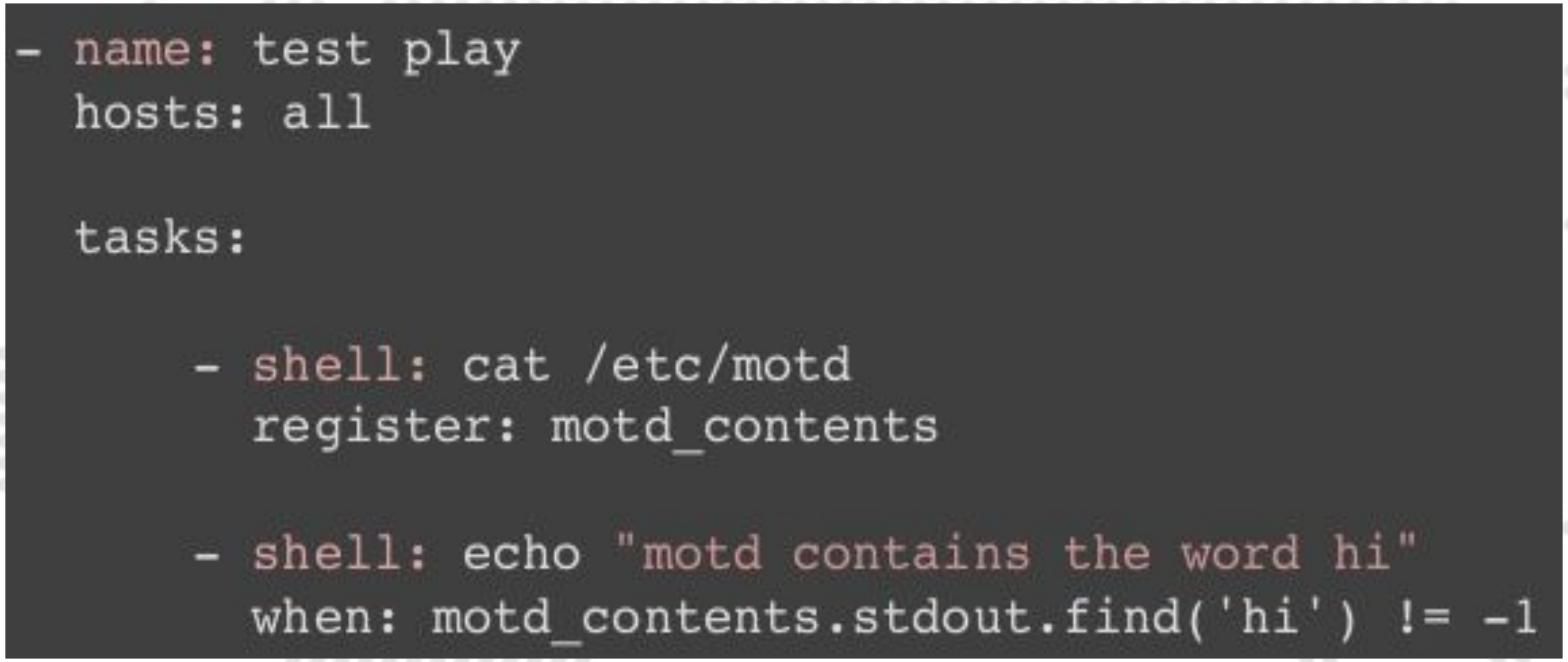
```
tasks:
    - shell: echo "Executing Action!"
      when: myvariable
```

- Jinja2 contains tests that combine well with "when":

```
tasks:
- shell: echo "I've got '{{ foo }}' and am not afraid to use it!"
  when: foo is defined
- fail: msg="Bailing out. this play requires 'bar'"
  when: bar is undefined
```

Conditionals

- As do registered variables



```
- name: test play
  hosts: all

  tasks:

      - shell: cat /etc/motd
        register: motd_contents

      - shell: echo "motd contains the word hi"
        when: motd_contents.stdout.find('hi') != -1
```

Conditionals Exercises

- ansible-playbook conditionals.yml –e 'myvariable=true'

Ansible Galaxy & Roles

Ansible Galaxy

- Ansible Galaxy is a free site for finding, downloading, rating, and reviewing all kinds of community developed Ansible Roles
- ansible-galaxy is a command-line tool for managing and creating Roles
- ansible-galaxy search mysql
- ansible-galaxy search --server https://galaxy-qa.ansible.com mysql --author geerlingguy
- ansible-galaxy info username.role_name
- ansible-galaxy install username.rolename

Ansible Galaxy

- ansible-galaxy list
- ansible-galaxy remove username.rolename
- ansible-galaxy init rolename

Ansible Configurations

- fork
- roles_path

Roles

- structured set of Playbooks, Handlers,
- Files, Variables, and Templates, that fulfil a defined purpose
- Problem
  - Playbooks can include plays from other playbooks, and handlers and variables from elsewhere
- Solution
  - Roles are an abstraction to cover everything
  - We bundle everything into a structured environment

Roles

- ❖ Roles provide the following benefits:
  - ➢ Defined scope of functionality
  - ➢ Promote re-use of configuration steps
  - ➢ Should represent business logic (e.g. Deploy a new webserver, or application layer)
- ❖ Community roles are available in the "ansible-galaxy"

Roles Construction

- ansible-galaxy init demo
- tree demo

Roles Folder Structure

- Defaults
  - main.yaml
  - all default values to be used by the roles
- Files
  - contains all files used in the role, and referred by copy module
- Handlers
  - place for all the handlers
- Meta
  - metadata like authors, dependencies, date, versions etc.
- Tasks
  - Playbooks used by the role, main.yml is the entry point

Roles Folder Structure

- ❖ Templates
  - ➢ files to be modified at runtime, .j2 extension in ideal scenarios
  - ➢ powered by Jinja2 templating engine
- ❖ Vars
  - ➢ another place for variables
  - ➢ more priority than default variables

Parameterized Includes

- Created when you pass parameters to an include:

```
tasks:
- include: core_app.yml admin=timmy
- include: core_app.yml admin=alice
- include: core_app.yml admin=bob
- include: core_app.yml
vars:
admin: sharon
ssh_keys:
- keys/one.txt
- keys/two.txt
```

Parameterized Includes

❖ Variables are used as normal within Tasks and Templates:

```
---
- name: Deploying core_app
  yum: name=core_app state=present
- name: Configuration
  copy: src=adminfile dest="/home/{{ admin }}/keyfile"
```

Using Roles

- Inside of our top-level Playbook, we need very little information
  - define hosts
  - declare the role we are using

```
---
- hosts: wordpress_hosts
roles:
  - nginx
  - php
  - mysql
  - wordpress
```

Using Roles

❖ Include your Role with the "roles" keyword:

```
---
- name: deploy-databases
  hosts: dbusers
    roles:
    - sshd
    - ntpd
    - { role: mysql, mysql_root_db_pass: foobar, mysql_db: none,
mysql_users: none }
```

Parameterized Roles

- Define defaults in "[role]/defaults/main.yml"

```
---
sshd_port: 22
sshd_permit_root_login: true
sshd_manage_service: "{{ false if ansible_virtualization_type ==
'docker' else true }}"
sshd_config_owner: root
sshd_config_group: root
sshd_config_mode: "0600"
```

Parameterized Roles

- Parameters are then passed in from a calling Playbook

```
---
- name: deploy-databases
hosts: dbusers
roles:
- { role: sshd, sshd_port: 22 }
- ntpd
- { role: mysql, mysql_root_db_pass: foobar, mysql_db: none, mysql_users: noblerog }
```

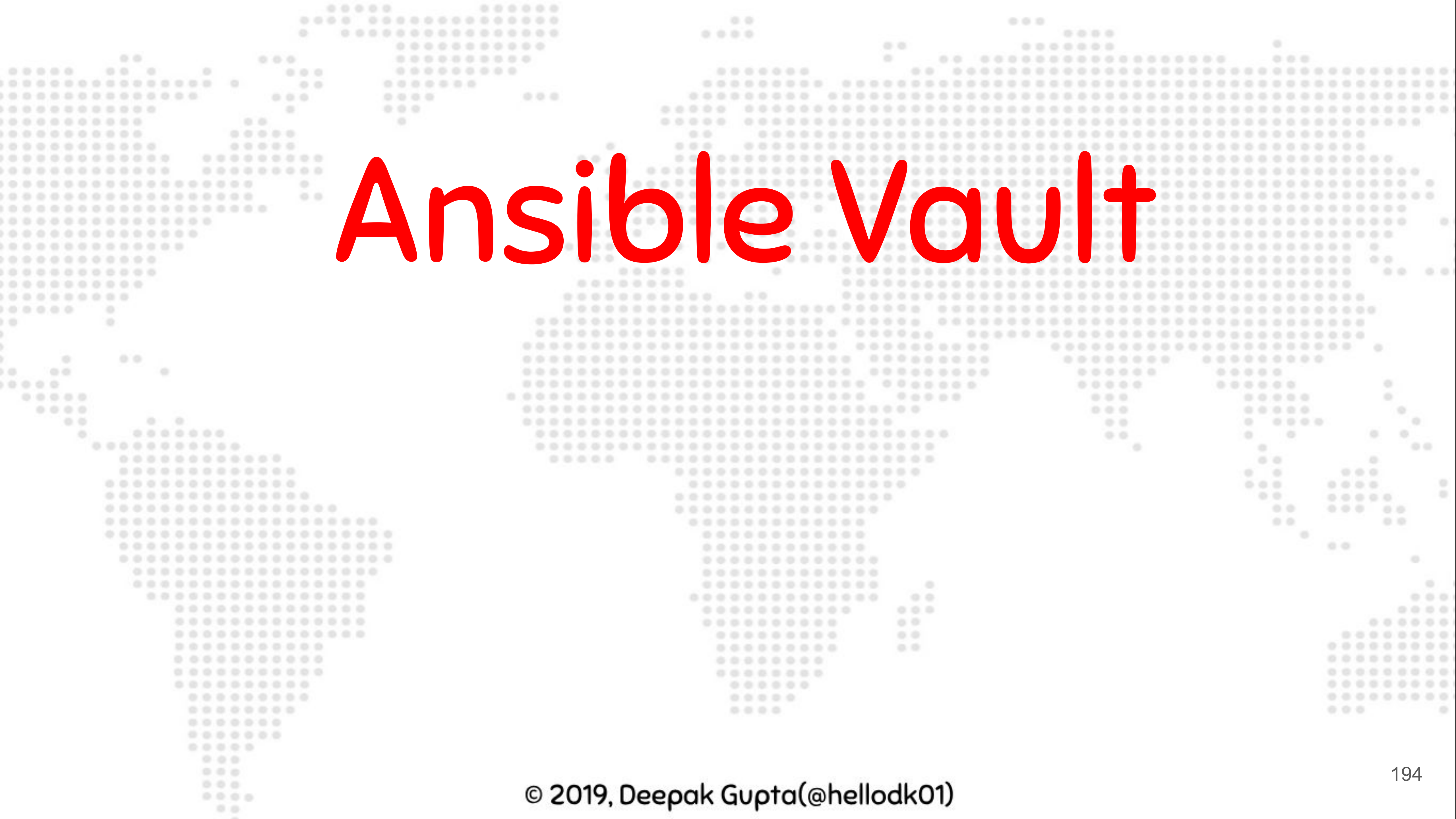
Structured Playbooks

- Playbooks can include other Playbooks
- This means we can have a master Playbook, and sub-Playbooks

```
- name: this is a play at the top level of a file
  hosts: all
  remote_user: root
  tasks:
  - name: say hi
  tags: foo
  shell: echo "hi..."
- include: load_balancers.yml
- include: webservers.yml
```

Exercises

- Role to create Apache Installation
- User Installation for Ansible
- Create a role for Java 6 Installation
- Reference
  - https://github.com/hellodk/swachalit



Ansible Vault

Ansible Vault

- ❖ allows keeping sensitive data such as passwords or keys in encrypted files,

  rather than as plaintext in our playbooks or roles
- ❖ Vault can encrypt:
  - ➢ Any structured data file used by Ansible
  - ➢ “group_vars/” and “host_vars/”
  - ➢ Inventory variables
  - ➢ “include_vars” and “vars_files”
  - ➢ variable files from the ansible command line: “-e
  - ➢ @file.yml” or “-e @file.json”
  - ➢ Role variables and defaults are also included
  - ➢ Handlers and Tasks

Ansible Vault

- ansible-vault create foo.yml
- ansible-vault edit foo.yml
- ansible-vault rekey foo.yml bar.yml baz.yml
- ansible-vault encrypt foo.yml bar.yml baz.yml
- ansible-vault decrypt foo.yml bar.yml baz.yml
- ansible-vault view foo.yml bar.yml baz.yml
- ansible-playbook site.yml --ask-vault-pass

That's All for Day 3