

Configuration Primer

by Feanil Patel
for Open edX Conference 2015
on October 13, 2015

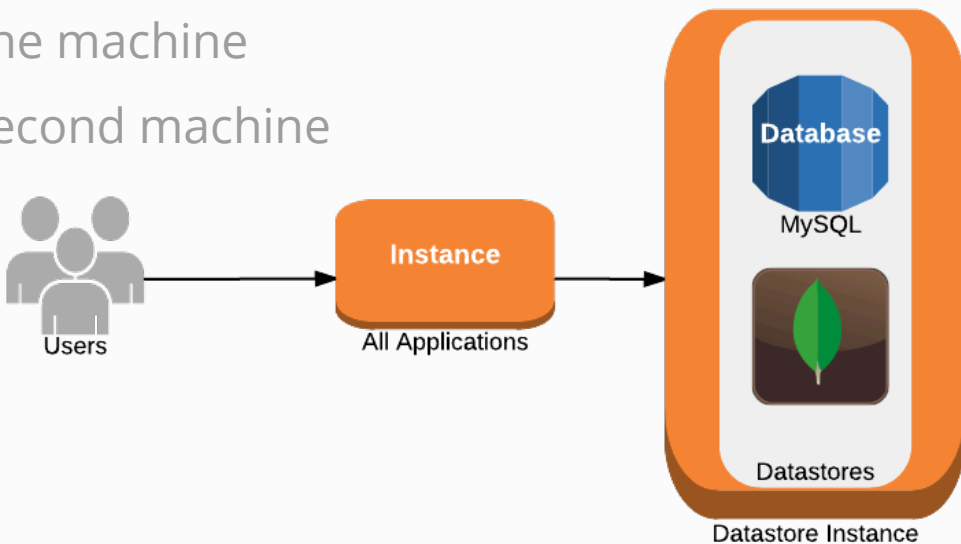


What We'll Cover

- Deployments Review
- ansible-playbook
 - Inventory
 - Playbooks
 - Roles
- Variable Management

Very Small Deployments

- Run from two machines
- All applications on one machine
- All datastores on a second machine

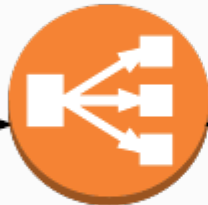


As You Get Bigger

- Start scaling your applications



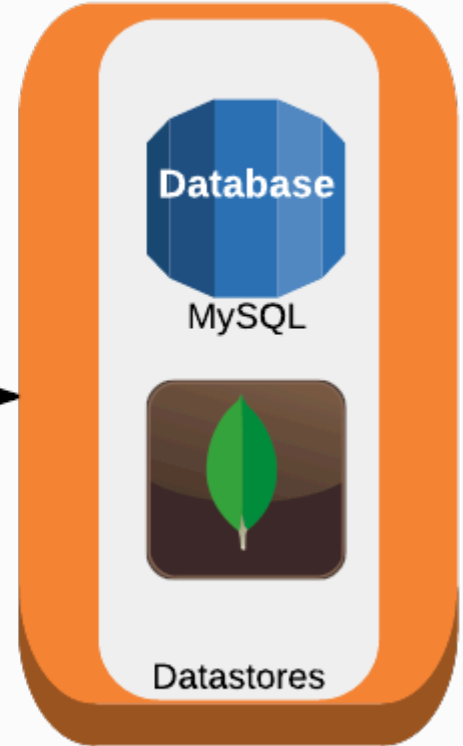
Users



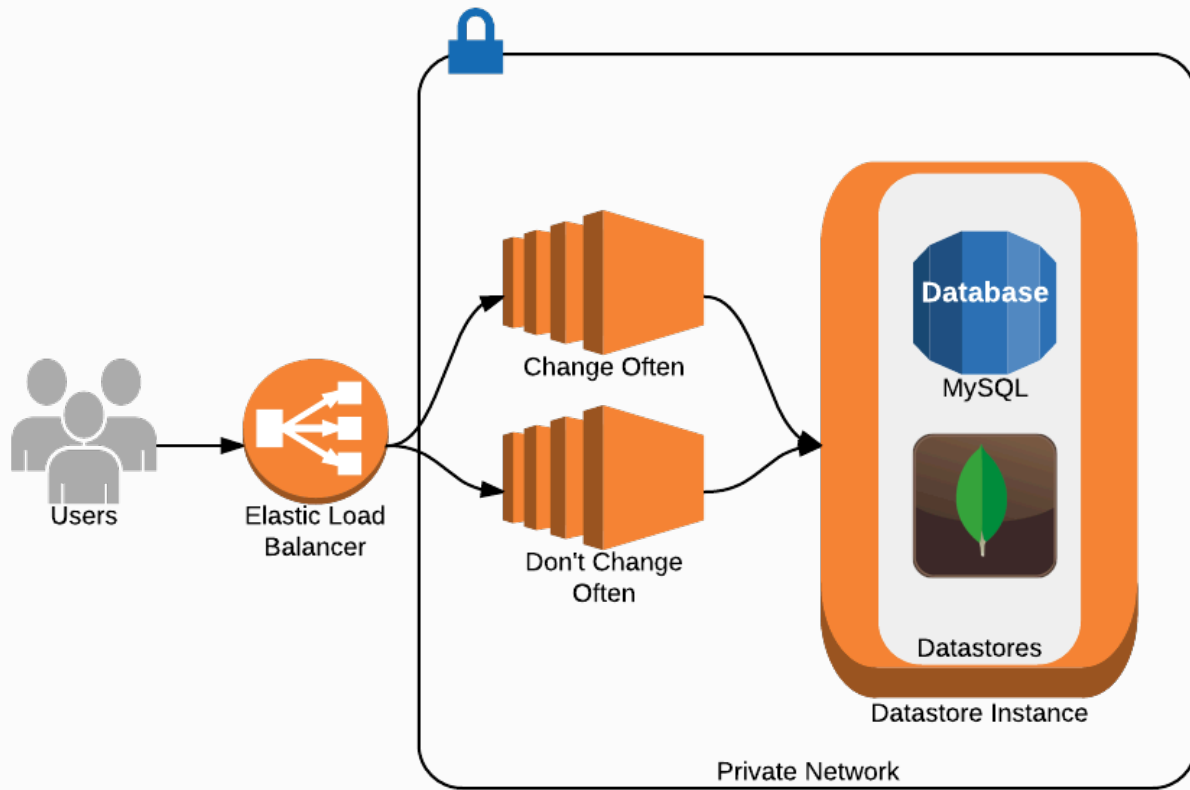
Elastic Load Balancer

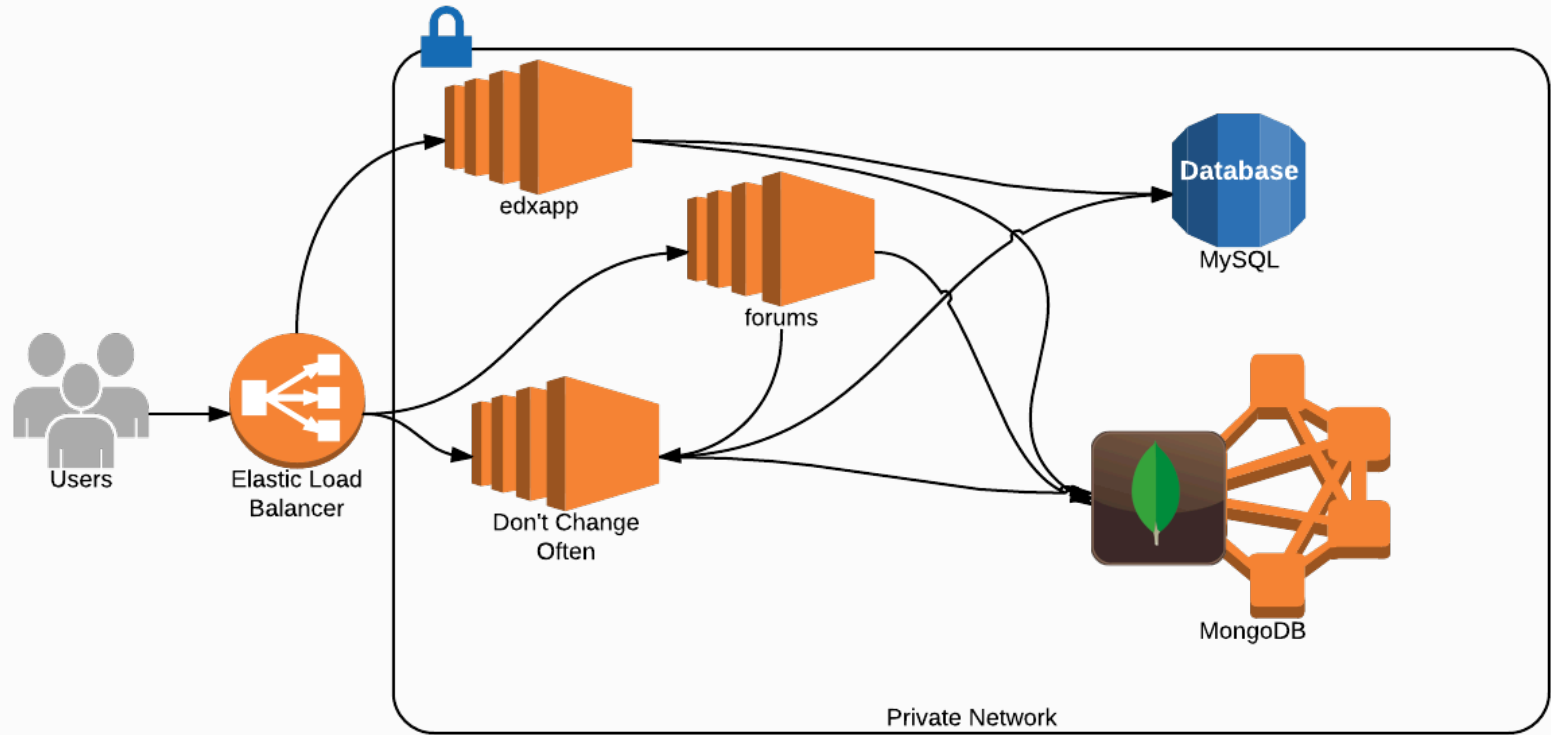


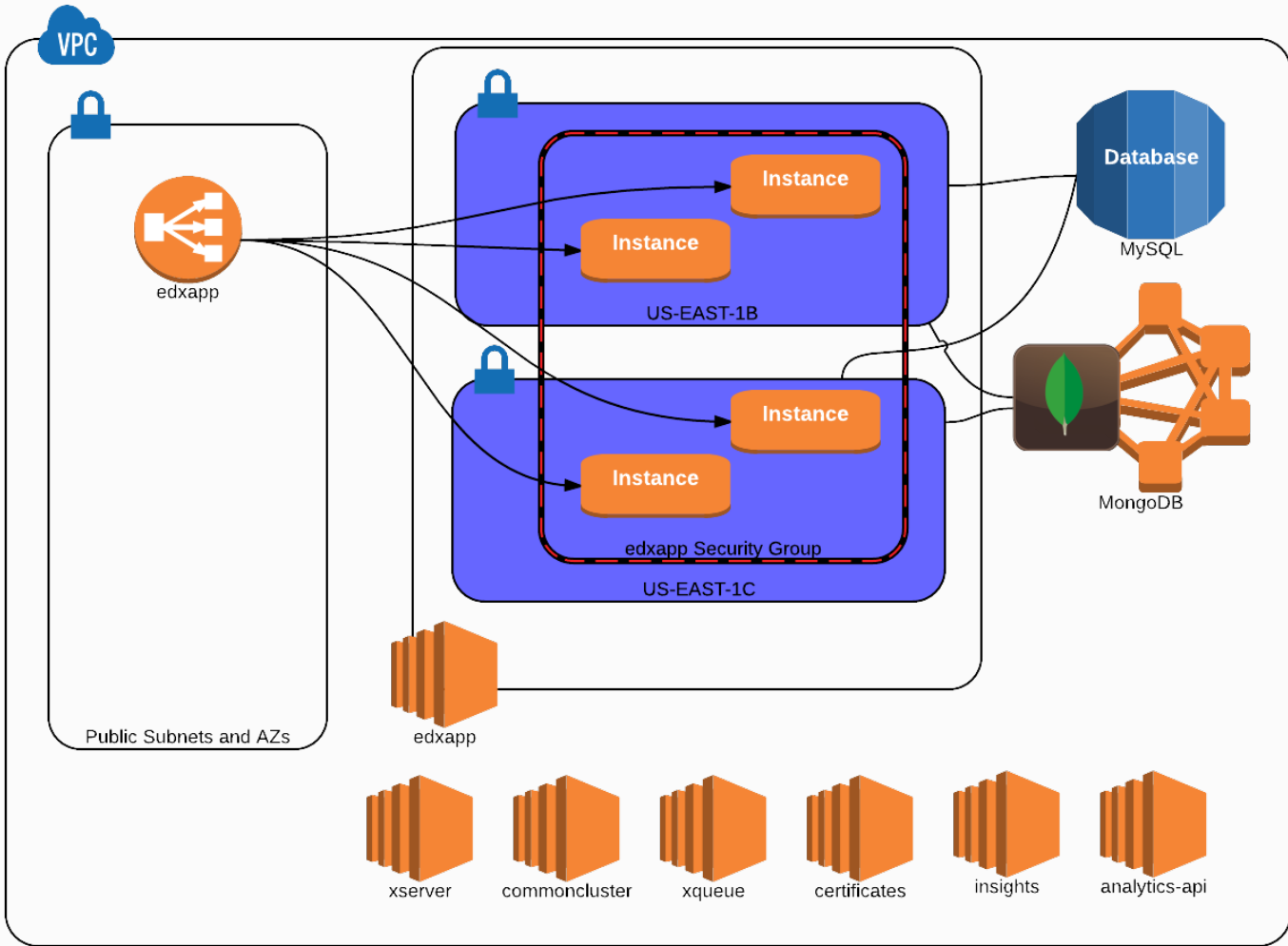
All Applications



Datastore Instance







Ansible

- Orchestration tool
- Imperative Tasks Execution
- Tasks use Modules
 - Basic OS modules
 - Cloud Modules
- docs.ansible.com

Google™ Custom Search

Introduction

Quickstart Video

Playbooks

Playbooks: Special Topics

About Modules

Module Index

All Modules

Cloud Modules

Clustering Modules

Commands Modules

Database Modules

Files Modules

Inventory Modules

Messaging Modules

Monitoring Modules

Network Modules

Notification Modules

Packaging Modules

Source Control Modules

System Modules

Docs » All Modules

All Modules

- [a10_server \(E\)](#) - Manage A10 Networks AX/SoftAX/Thunder/vThunder devices
- [a10_service_group \(E\)](#) - Manage A10 Networks devices' service groups
- [a10_virtual_server \(E\)](#) - Manage A10 Networks devices' virtual servers
- [accelerate](#) - Enable accelerated mode on remote node
- [acl](#) - Sets and retrieves file ACL information.
- [add_host](#) - add a host (and alternatively a group) to the ansible-playbook in-memory inventory
- [airbrake_deployment \(E\)](#) - Notify airbrake about app deployments
- [alternatives \(E\)](#) - Manages alternative programs for common commands
- [apache2_module](#) - enables/disables a module of the Apache2 webserver
- [apk \(E\)](#) - Manages apk packages
- [apt](#) - Manages apt-packages
- [apt_key](#) - Add or remove an apt key
- [apt_repository](#) - Add and remove APT repositories
- [apt_rpm](#) - apt_rpm package manager
- [assemble](#) - Assembles a configuration file from fragments
- [assert](#) - Fail with custom message
- [async_status](#) - Obtain status of asynchronous task
- [at \(E\)](#) - Schedule the execution of a command or script file via the at command.
- [authorized_key](#) - Adds or removes an SSH authorized key
- [azure](#) - create or terminate a virtual machine in azure
- [bigip_facts \(E\)](#) - Collect facts from F5 BIG-IP devices
- [bigip_monitor_http \(E\)](#) - Manages F5 BIG-IP LTM http monitors
- [bigip_monitor_tcp \(E\)](#) - Manages F5 BIG-IP LTM tcp monitors
- [bigip_node \(E\)](#) - Manages F5 BIG-IP LTM nodes

- Introduction
- Quickstart Video
- Playbooks
- Playbooks: Special Topics
- About Modules

Module Index

All Modules

- Cloud Modules
- Clustering Modules
- Commands Modules
- Database Modules
- Files Modules
- Inventory Modules
- Messaging Modules
- Monitoring Modules
- Network Modules
- Notification Modules
- Packaging Modules
- Source Control Modules
- System Modules
- Utilities Modules
- Web Infrastructure Modules
- Windows Modules

- Detailed Guides
- Developer Information
- Ansible Tower

All Modules

- [a10_server \(E\)](#) - Manage A10 Networks AX/SoftAX/Thunder/vThunder devices
- [a10_service_group \(E\)](#) - Manage A10 Networks devices' service groups
- [a10_virtual_server \(E\)](#) - Manage A10 Networks devices' virtual servers
- [accelerate](#) - Enable accelerated mode on remote node
- [acl](#) - Sets and retrieves file ACL information.
- [add_host](#) - add a host (and alternatively a group) to the ansible-playbook in-memory inventory
- [airbrake_deployment \(E\)](#) - Notify airbrake about app deployments
- [alternatives \(E\)](#) - Manages alternative programs for common commands
- [apache2_module](#) - enables/disables a module of the Apache2 webserver
- [apk \(E\)](#) - Manages apk packages
- [apt](#) - Manages apt-packages
- [apt_key](#) - Add or remove an apt key
- [apt_repository](#) - Add and remove APT repositories
- [apt_rpm](#) - apt_rpm package manager
- [assemble](#) - Assembles a configuration file from fragments
- [assert](#) - Fail with custom message
- [async_status](#) - Obtain status of asynchronous task
- [at \(E\)](#) - Schedule the execution of a command or script file via the at command.
- [authorized_key](#) - Adds or removes an SSH authorized key
- [azure](#) - create or terminate a virtual machine in azure
- [bigip_facts \(E\)](#) - Collect facts from F5 BIG-IP devices
- [bigip_monitor_http \(E\)](#) - Manages F5 BIG-IP LTM http monitors
- [bigip_monitor_tcp \(E\)](#) - Manages F5 BIG-IP LTM tcp monitors
- [bigip_node \(E\)](#) - Manages F5 BIG-IP LTM nodes
- [bigip_pool \(E\)](#) - Manages F5 BIG-IP LTM pools
- [bigip_pool_member \(E\)](#) - Manages F5 BIG-IP LTM pool members
- [bigpanda \(E\)](#) - Notify BigPanda about deployments
- [boundary_meter \(E\)](#) - Manage boundary meters
- [bower \(E\)](#) - Manage bower packages with bower
- [bundler \(E\)](#) - Manage Ruby Gem dependencies with Bundler

About Modules

Module Index

All Modules

- Cloud Modules
- Clustering Modules
- Commands Modules
- Database Modules
- Files Modules
- Inventory Modules
- Messaging Modules
- Monitoring Modules
- Network Modules
- Notification Modules
- Packaging Modules
- Source Control Modules
- System Modules
- Utilities Modules
- Web Infrastructure Modules
- Windows Modules

Detailed Guides

- Developer Information
- Ansible Tower
- Community Information & Contributing
- Ansible Galaxy
- Testing Strategies
- Frequently Asked Questions
- Glossary

- [accelerate](#) - Enable accelerated mode on remote node
- [acl](#) - Sets and retrieves file ACL information.
- [add_host](#) - add a host (and alternatively a group) to the ansible-playbook in-memory inventory
- [airbrake_deployment](#) (E) - Notify airbrake about app deployments
- [alternatives](#) (E) - Manages alternative programs for common commands
- [apache2_module](#) - enables/disables a module of the Apache2 webserver
- [apk](#) (E) - Manages apk packages
- [apt](#) - Manages apt-packages
- [apt_key](#) - Add or remove an apt key
- [apt_repository](#) - Add and remove APT repositories
- [apt_rpm](#) - apt_rpm package manager
- [assemble](#) - Assembles a configuration file from fragments
- [assert](#) - Fail with custom message
- [async_status](#) - Obtain status of asynchronous task
- [at](#) (E) - Schedule the execution of a command or script file via the at command.
- [authorized_key](#) - Adds or removes an SSH authorized key
- [azure](#) - create or terminate a virtual machine in azure
- [bigip_facts](#) (E) - Collect facts from F5 BIG-IP devices
- [bigip_monitor_http](#) (E) - Manages F5 BIG-IP LTM http monitors
- [bigip_monitor_tcp](#) (E) - Manages F5 BIG-IP LTM tcp monitors
- [bigip_node](#) (E) - Manages F5 BIG-IP LTM nodes
- [bigip_pool](#) (E) - Manages F5 BIG-IP LTM pools
- [bigip_pool_member](#) (E) - Manages F5 BIG-IP LTM pool members
- [bigpanda](#) (E) - Notify BigPanda about deployments
- [boundary_meter](#) (E) - Manage boundary meters
- [bower](#) (E) - Manage bower packages with bower
- [bundler](#) (E) - Manage Ruby Gem dependencies with Bundler
- [bzip](#) (E) - Deploy software (or files) from bzip branches
- [campfire](#) (E) - Send a message to Campfire
- [capabilities](#) (E) - Manage Linux capabilities
- [circonus_annotation](#) (E) - create an annotation in circonus
- [clc_blueprint_package](#) (E) - deploys a blue print package on a set of servers in CenturyLink Cloud.
- [clc_firewall_policy](#) (E) - Create/delete/update firewall policies
- [clc_group](#) (E) - Create/delete Server Groups at Centurylink Cloud

- Network Modules
- Notification Modules
- Packaging Modules
- Source Control Modules
- System Modules
- Utilities Modules
- Web Infrastructure Modules
- Windows Modules

- Detailed Guides
- Developer Information
- Ansible Tower
- Community Information & Contributing
- Ansible Galaxy
- Testing Strategies
- Frequently Asked Questions
- Glossary
- YAML Syntax

- [at \(E\)](#) - Schedule the execution of a command or script file via the at command.
- [authorized_key](#) - Adds or removes an SSH authorized key
- [azure](#) - create or terminate a virtual machine in azure
- [bigip_facts \(E\)](#) - Collect facts from F5 BIG-IP devices
- [bigip_monitor_http \(E\)](#) - Manages F5 BIG-IP LTM http monitors
- [bigip_monitor_tcp \(E\)](#) - Manages F5 BIG-IP LTM tcp monitors
- [bigip_node \(E\)](#) - Manages F5 BIG-IP LTM nodes
- [bigip_pool \(E\)](#) - Manages F5 BIG-IP LTM pools
- [bigip_pool_member \(E\)](#) - Manages F5 BIG-IP LTM pool members
- [bigpanda \(E\)](#) - Notify BigPanda about deployments
- [boundary_meter \(E\)](#) - Manage boundary meters
- [bower \(E\)](#) - Manage bower packages with bower
- [bundler \(E\)](#) - Manage Ruby Gem dependencies with Bundler
- [bzip \(E\)](#) - Deploy software (or files) from bzip branches
- [campfire \(E\)](#) - Send a message to Campfire
- [capabilities \(E\)](#) - Manage Linux capabilities
- [circonus_annotation \(E\)](#) - create an annotation in circonus
- [clc_blueprint_package \(E\)](#) - deploys a blue print package on a set of servers in CenturyLink Cloud.
- [clc_firewall_policy \(E\)](#) - Create/delete/update firewall policies
- [clc_group \(E\)](#) - Create/delete Server Groups at Centurylink Cloud
- [clc_loadbalancer \(E\)](#) - Create, Delete shared loadbalancers in CenturyLink Cloud.
- [clc_modify_server \(E\)](#) - modify servers in CenturyLink Cloud.
- [clc_publicip \(E\)](#) - Add and Delete public ips on servers in CenturyLink Cloud.
- [clc_server \(E\)](#) - Create, Delete, Start and Stop servers in CenturyLink Cloud.
- [cloudformation](#) - Create or delete an AWS CloudFormation stack
- [cloudtrail \(E\)](#) - manage CloudTrail creation and deletion
- [command](#) - Executes a command on a remote node
- [composer \(E\)](#) - Dependency Manager for PHP
- [consul \(E\)](#) - Add, modify & delete services within a consul cluster.
- [consul_acl \(E\)](#) - manipulate consul acl keys and rules
- [consul_kv \(E\)](#) - Manipulate entries in the key/value store of a consul cluster.
- [consul_session \(E\)](#) - manipulate consul sessions
- [copy](#) - Copies files to remote locations.

Testing Strategies

Frequently Asked Questions

Glossary

YAML Syntax

- `circonus_annotation` (E) - create an annotation in `circonus`
- `clc_blueprint_package` (E) - deploys a blue print package on a set of servers in CenturyLink Cloud.
- `clc_firewall_policy` (E) - Create/delete/update firewall policies
- `clc_group` (E) - Create/delete Server Groups at Centurylink Cloud
- `clc_loadbalancer` (E) - Create, Delete shared loadbalancers in CenturyLink Cloud.
- `clc_modify_server` (E) - modify servers in CenturyLink Cloud.
- `clc_publicip` (E) - Add and Delete public ips on servers in CenturyLink Cloud.
- `clc_server` (E) - Create, Delete, Start and Stop servers in CenturyLink Cloud.
- `cloudformation` - Create or delete an AWS CloudFormation stack
- `cloudtrail` (E) - manage CloudTrail creation and deletion
- `command` - Executes a command on a remote node
- `composer` (E) - Dependency Manager for PHP
- `consul` (E) - Add, modify & delete services within a consul cluster.
- `consul_acl` (E) - manipulate consul acl keys and rules
- `consul_kv` (E) - Manipulate entries in the key/value store of a consul cluster.
- `consul_session` (E) - manipulate consul sessions
- `copy` - Copies files to remote locations.
- `cpanm` (E) - Manages Perl library dependencies.
- `cron` - Manage `cron.d` and `crontab` entries.
- `cronvar` (E) - Manage variables in `crontabs`
- `crypttab` (E) - Encrypted Linux block devices
- `cs_account` (E) - Manages accounts on Apache CloudStack based clouds.
- `cs_affinitygroup` (E) - Manages affinity groups on Apache CloudStack based clouds.
- `cs_domain` (E) - Manages domains on Apache CloudStack based clouds.
- `cs_facts` (E) - Gather facts on instances of Apache CloudStack based clouds.
- `cs_firewall` (E) - Manages firewall rules on Apache CloudStack based clouds.
- `cs_instance` (E) - Manages instances and virtual machines on Apache CloudStack based clouds.
- `cs_instancegroup` (E) - Manages instance groups on Apache CloudStack based clouds.
- `cs_ip_address` (E) - Manages public IP address associations on Apache CloudStack based clouds.
- `cs_iso` (E) - Manages ISO images on Apache CloudStack based clouds.
- `cs_network` (E) - Manages networks on Apache CloudStack based clouds.
- `cs_portforward` (E) - Manages port forwarding rules on Apache CloudStack based clouds.
- `cs_project` (E) - Manages projects on Apache CloudStack based clouds.
- `cs_securitygroup` (E) - Manages security groups on Apache CloudStack based clouds.

- [cs_facts \(E\)](#) - Gather facts on instances of Apache CloudStack based clouds.
- [cs_firewall \(E\)](#) - Manages firewall rules on Apache CloudStack based clouds.
- [cs_instance \(E\)](#) - Manages instances and virtual machines on Apache CloudStack based clouds.
- [cs_instancegroup \(E\)](#) - Manages instance groups on Apache CloudStack based clouds.
- [cs_ip_address \(E\)](#) - Manages public IP address associations on Apache CloudStack based clouds.
- [cs_iso \(E\)](#) - Manages ISO images on Apache CloudStack based clouds.
- [cs_network \(E\)](#) - Manages networks on Apache CloudStack based clouds.
- [cs_portforward \(E\)](#) - Manages port forwarding rules on Apache CloudStack based clouds.
- [cs_project \(E\)](#) - Manages projects on Apache CloudStack based clouds.
- [cs_securitygroup \(E\)](#) - Manages security groups on Apache CloudStack based clouds.
- [cs_securitygroup_rule \(E\)](#) - Manages security group rules on Apache CloudStack based clouds.
- [cs_sshkeypair \(E\)](#) - Manages SSH keys on Apache CloudStack based clouds.
- [cs_staticnat \(E\)](#) - Manages static NATs on Apache CloudStack based clouds.
- [cs_template \(E\)](#) - Manages templates on Apache CloudStack based clouds.
- [cs_user \(E\)](#) - Manages users on Apache CloudStack based clouds.
- [cs_vmsnapshot \(E\)](#) - Manages VM snapshots on Apache CloudStack based clouds.
- [datadog_event \(E\)](#) - Posts events to DataDog service
- [datadog_monitor \(E\)](#) - Manages Datadog monitors
- [debconf \(E\)](#) - Configure a .deb package
- [debug](#) - Print statements during execution
- [digital_ocean](#) - Create/delete a droplet/SSH_key in DigitalOcean
- [digital_ocean_domain](#) - Create/delete a DNS record in DigitalOcean
- [digital_ocean_sshkey](#) - Create/delete an SSH key in DigitalOcean
- [django_manage](#) - Manages a Django application.
- [dnf \(E\)](#) - Manages packages with the *dnf* package manager
- [dnsimple \(E\)](#) - Interface with dnsimple.com (a DNS hosting service).
- [dnsmadeeasy \(E\)](#) - Interface with dnsmadeeasy.com (a DNS hosting service).
- [docker](#) - manage docker containers
- [docker_image](#) - manage docker images
- [dpkg_selections \(E\)](#) - Dpkg package selection selections
- [dynamodb_table \(E\)](#) - Create, update or delete AWS Dynamo DB tables.
- [easy_install](#) - Installs Python libraries
- [ec2](#) - create, terminate, start or stop an instance in ec2

- [digital_ocean](#) - Create/delete a droplet/SSH_key in DigitalOcean
- [digital_ocean_domain](#) - Create/delete a DNS record in DigitalOcean
- [digital_ocean_sshkey](#) - Create/delete an SSH key in DigitalOcean
- [django_manage](#) - Manages a Django application.
- [dnf \(E\)](#) - Manages packages with the *dnf* package manager
- [dnsimple \(E\)](#) - Interface with dnsimple.com (a DNS hosting service).
- [dnsmadeeasy \(E\)](#) - Interface with dnsmadeeasy.com (a DNS hosting service).
- [docker](#) - manage docker containers
- [docker_image](#) - manage docker images
- [dpkg_selections \(E\)](#) - Dpkg package selection selections
- [dynamodb_table \(E\)](#) - Create, update or delete AWS Dynamo DB tables.
- [easy_install](#) - Installs Python libraries
- [ec2](#) - create, terminate, start or stop an instance in ec2
- [ec2_ami](#) - create or destroy an image in ec2
- [ec2_ami_copy \(E\)](#) - copies AMI between AWS regions, return new image id
- [ec2_ami_find](#) - Searches for AMIs to obtain the AMI ID and other information
- [ec2_ami_search \(D\)](#) - Retrieve AWS AMI information for a given operating system.
- [ec2_asg](#) - Create or delete AWS Autoscaling Groups
- [ec2_eip](#) - associate an EC2 elastic IP with an instance.
- [ec2_elb](#) - De-registers or registers instances from EC2 ELBs
- [ec2_elb_facts \(E\)](#) - Gather facts about EC2 Elastic Load Balancers in AWS
- [ec2_elb_lb](#) - Creates or destroys Amazon ELB.
- [ec2_eni \(E\)](#) - Create and optionally attach an Elastic Network Interface (ENI) to an instance
- [ec2_eni_facts \(E\)](#) - Gather facts about ec2 ENI interfaces in AWS
- [ec2_facts](#) - Gathers facts about remote hosts within ec2 (aws)
- [ec2_group](#) - maintain an ec2 VPC security group.
- [ec2_key](#) - maintain an ec2 key pair.
- [ec2_lc](#) - Create or delete AWS Autoscaling Launch Configurations
- [ec2_metric_alarm](#) - Create/update or delete AWS Cloudwatch 'metric alarms'
- [ec2_remote_facts \(E\)](#) - ask EC2 for information about other instances.
- [ec2_scaling_policy](#) - Create or delete AWS scaling policies for Autoscaling groups
- [ec2_snapshot](#) - creates a snapshot from an existing volume
- [ec2_tag](#) - create and remove tag(s) to ec2 resources.

ansible-playbook

```
ansible-playbook
```

```
-i ec2.py # Inventory
```

```
playbook.yml # Playbook
```

```
-e@/path/to/overrides.yml # Overrides
```


ansible-playbook

ansible-playbook

-i ec2.py # Inventory

playbook.yml # Playbook

-e@/path/to/overrides.yml # Overrides

Inventory Files

- INI files
 - i my_servers.ini # Inventory**
- Python program
 - Output JSON
 - i ec2.py # Inventory**

Example Inventory INI

inventory.ini

mail.example.com

[webservers]

foo.example.com

bar.example.com

[dbservers]

one.example.com

two.example.com

three.example.com

Example Inventory JSON

```
{  
  "InService":  
    [  
      "10.0.0.1",  
      "10.0.0.2"  
    ],  
  "TerminatingWait":  
    [  
      "10.0.3.1",  
      "10.0.3.4"  
    ]  
}
```

ansible-playbook

ansible-playbook

-i ec2.py # Inventory

playbook.yml # Playbook

-e@/path/to/overrides.yml # Overrides

Anatomy of a Playbook

- hosts: <group from inventory>
pre_tasks: <list of tasks>
roles: <list of roles>
post_tasks: <list of tasks>
- hosts: <another group>
roles: <different roles>

Deploy Everything

- hosts: edxapp
roles:
 - edxapp
- hosts: workers
roles:
 - role: edxapp
celery_worker: True
- hosts: forums
roles:
 - forums
 - elasticsearch

Rolling Deploy

- hosts: edxapp
 - serial: 1
 - pre_tasks:
 - # task to pull server out of a load balancer
 - roles:
 - edxapp
 - post_tasks:
 - # task to put server back in the load balancer

Image Based Deploy

- hosts: localhost

roles:

- new_deploy_group

- number_of_new_machines: {{ new_machines }}

- new_image: {{ image_id }}

- add_group_to_lb

- group_name: {{ registered_new_deploy_group }}

- delete_group

- group_name: {{ current_deploy_group }}

Image Based Deploy

```
- hosts: localhost
  roles:
    - new_deploy_group
      number_of_new_machines: {{ new_machines }}
      new_image: {{ image_id }}
- hosts: registered_new_deploy_group
  roles:
    - smoke_test
- hosts: localhost
  roles:
    - add_group_to_lb
      group_name: {{ registered_new_deploy_group }}
      when: smoke_test_passed == True
    - delete_group
      group_name: {{ current_deploy_group }}
      when: smoke_test_passed == True
    - delete_group
      group_name: {{ registered_new_deploy_group }}
      when: smoke_test_passed == False
```

edX Playbooks

- `configuration/playbooks`
 - Vagrant related playbooks
- `configuration/playbooks/edx-east`
 - edx.org related playbooks

Examples from Configuration

- [edx_continuous_integration.yml](#)
- [edx_provision.yml](#)
- [edxapp.yml](#)
- [insights.yml](#)

Roles

- Usually role per app/git-repository
 - Most apps run from one git repository
- All vars for a role prefixed with the role name
- ALL CAPS vars are expected to be overridden
 - Just convention
- Lowercase vars are generally meant to be internal to the role

All the edX Roles

playbooks/roles



Role Layout

role/

[defaults/main.yml](#)

[tasks/main.yml](#)

[meta/main.yml](#)

[templates/path/to/template.j2](#)

edx-service role

- Base role for edx-services
- Creates User/Directories
- Checks out code
- Creates config file
- DOES NOT
 - Create Supervisor Config
 - Create Virtualenvs
 - Do anything django specific

edx-service role

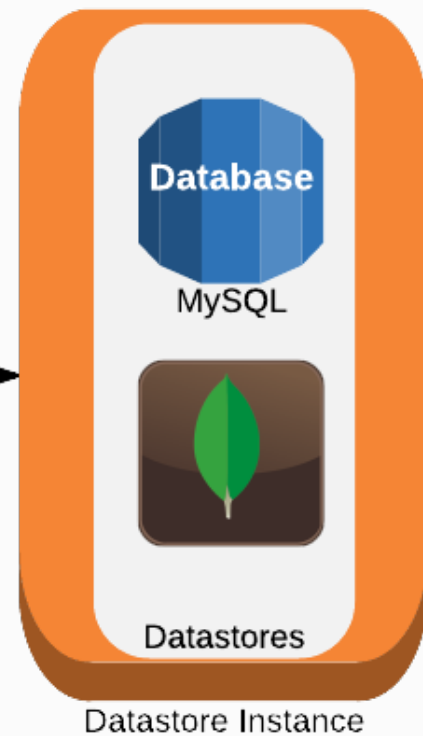
- Base role for most new IDAs
- Ecommerce
- Programs
- Insights

edxapp role

- The base role for the edx-platform
- Not currently using the edx-service role
- It also deploys themes/microsites repos
- Runs in two variants
 - Web app(default)
 - Celery Worker
- Has multiple Virtualenvs
 - Application venv
 - Codejail venv

nginx role

- Holds nginx templates for all apps
- Templates deployed based on the `nginx_sites` variable
- Can deal with SSL
- Can run on the same machine as the app
- Can run as the LB on a separate cluster



```
- role: nginx
  nginx_sites:
    - cms
    - lms
    - xqueue
    - xserver
    - certs
    - analytics_api
    - ecommerce
  nginx_default_sites:
    - lms
```

Variables

- `/edx/bin/update`
- General `-e` usage
- How `edx.org` does it

/edx/bin/update

- Script created by the edx-ansible role
- Runs ansible locally on a machine
- Used mostly for sandboxes
- Relies on `/edx/app/edx_ansible/server-vars.yml`
 - Not safe in production environments

ansible-playbook

```
ansible-playbook
```

```
-i ec2.py # Inventory
```

```
playbook.yml # Playbook
```

```
-e@/path/to/overrides.yml # Overrides
```


-e is your friend

- -e @/path/to/vars.yml
- Use this to refer to your secret overrides

How edx.org does it

- EDC
 - Environment
 - stage
 - prod
 - loadtest
 - Deployment
 - edge
 - edx
 - Cluster
 - edxapp
 - forum
 - insights

How edx.org does it

- AMIs
 - Userdata builds an instance
 - -e @edx.yml -e @stage-edx.yml
 - Override for the deployment first
 - Override for the environment and deployment
 - edx.yml
 - Vars that are the same in all environments(stage, prod, loadtest)
 - stage-edx.yml
 - Sections for each relevant role

Making it Work for You

- Run Ansible against your servers
 - [Rolling Deploys](#)
 - Pre/Post task for dealing with Load Balancers
- Build Images for your Infrastructure

Takeaway

- Roles
 - Atoms of edx
- Vars
 - Your special snowflake
 - Keep them safe
- Playbooks
 - Build your own
 - Throw them away

Make it Better!

- Bug Fixes!
- New Infrastructure Types!
 - Openstack
 - GCE
- New Operating Systems!
 - Redhat
 - NixOS
- PRs!

Links

- <http://docs.ansible.com>
- <http://www.slideshare.net/feanil/configuration-primer>

Thanks!
Questions?

@feanil

feanil@edx.org



Vagrant

- [vagrant/base](#)
 - Used to build base boxes
- [vagrant/release](#)
 - Prebuilt base boxes that will startup faster