Utilizing Ansible to Manage a Highly Available MySQL Environment

MYSQL – ANSIBLE - MHA

Presented by ALKIN TEZUYSAL , MIKLOS SZEL

April 14 2015

Pythian®
love your data

About : Alkin Tezuysal

- Currently Team Manager, Pythian
- 20 years experience in RDBMS world
- Acted as Sr. DBA to Supervisor roles
- Previously worked
  - ebay Intl, Supervisor
  - Bank of America, Sr. DBA
  - AT&T, Sr. DBA
- How to Contact:
  - Email: tezuysal@pythian.com
  - Twitter: @ask_dba
  - Linkedin: tr.linkedin.com/in/askdba/en

About : Miklos ‘Mukka’ Szel

- Currently MySQL Consultant, Pythian
- 10+ years experience System and Database world
- Acted as Sr. DBA, Sr. Ops, Developer
- Previously worked
  - Own startup
  - ISP
  - Walt Disney
- How to Contact:
  - Email: szel@pythian.com
  - Twitter: @42mukka
  - Linkedin: hu.linkedin.com/in/miklosszel/en

Ansible in a Nutshell

- ✓ Simple
- ✓ Agentless
- ✓ Easy to manage
- ✓ Idempotent
- ✓ 100% Python
- ✓ Configuration management
- ✓ Uses ssh

For more: http://docs.ansible.com/intro_installation.html

MHA in a Nutshell

- ✓ Automated Master failover
- ✓ Interactive Master failover
- ✓ Non-interactive Master failover
- ✓ Online Master switching
- ✓ Easy to configure
- ✓ Open Source HA utility

For more: https://code.google.com/p/mysql-master-ha/

MySQL in a Nutshell

- ✓ De-facto standard for web, e-commerce and startup companies
- ✓ Easy to manage and use
- ✓ Why we all are here

For more: http://www.oracle.com/us/products/mysql/overview/index.html

Back to Ansible

1) Installation
2) Configuration
3) Best practices
4) Demo on how to use with MySQL-MHA

Installation - I

- Verify your version of Python, install pip:

```
$ sudo easy_install pip
```

- Add Python modules:

```
$ sudo pip install paramiko PyYAML Jinja2 httplib2
```

- Install Ansible via pip :

```
$ sudo pip install ansible
```

- Install Ansible via yum:

```
# install the epel-release RPM if needed on CentOS, RHEL, or Scientific Linux

$ sudo yum install ansible
```

- On OSX :

```
$ brew install ansible
```

For more: http://docs.ansible.com/intro_installation.html

Installation - II

- Set hosts to test:

```
$ echo "127.0.0.1" > ~/ansible_hosts
$ export ANSIBLE_HOSTS=~/ansible_hosts
```

- Test your installation:

```
$ ansible all -m ping --ask-pass
SSH password:
127.0.0.1 | success >> {
    "changed": false,
    "ping": "pong"
}
```

Configuration- I

- Setup Config file:
  - ANSIBLE_CONFIG (an environment variable)
  - ansible.cfg (in the current directory)
  - ansible.cfg (in the home directory)
  - /etc/ansible/ansible.cfg

For more: http://docs.ansible.com/intro_configuration.html

Configuration- II

- Inventory file : Define hosts and groups
- Default file : /etc/ansible/hosts

```
[databases]
54.167.36.187   mysql_role=master server_id=1
23.22.187.189   mysql_role=slave server_id=2 backup_src=54.167.36.187
54.87.24.162    mysql_role=slave server_id=3 backup_src=54.167.36.187
[system]
54.167.36.187  mycnf=plsc_s1 mysql_role=master  nickname=dev-plsc-m
23.22.187.189  mycnf=plsc_s2 mysql_role=slave  nickname=dev-plsc-s1
54.87.24.162   mysql_role=slave  nickname=dev-plsc-s2ample:
```

- Dynamic Inventory :
  - AWS EC2 External Inventory Script (ec2.py)

```
# ansible-playbook -i "localhost," ansible/playbooks/launch_ec2.yml
# /ec2.py --list
```

For more: http://docs.ansible.com/intro_inventory.html , http://docs.ansible.com/intro_dynamic_inventory.html#example-aws-ec2-external-inventory-script

Configuration- III

- Playbooks
  - YAML format
  - One or more “plays” in a list
  - Executes tasks
  - Supports hosts
  - Supports roles
  - Supports tags
  - Supports groups
  - Supports remote_user
  - Provides idempotent runs against host groups
  - Uses ansible modules

  Example:

```
$ ansible-playbook playbook.yml --list-hosts
$ ansible-playbook playbook.yml --list-tasks
$ ansible-playbook playbook.yml -f 10
$ ansible-playbook playbook.yml --tags=setup,configure --list-tasks
$ ansible-playbook playbook.yml --tags=always,setup,configure --list-tasks
```

For more: http://docs.ansible.com/playbooks_intro.html

Configuration- IV

- Ansible built-in modules
  - Providing robust functions
  - Runtime or via playbook
  - Can be customized or developed

Example:

Adhoc

```
$ansible –i hosts.yml dbservers -m service -a "name=mysqld state=started"
$ansible –i hosts.yml webservers -m command -a "/sbin/reboot -t now"
```

Playbooks

```
- name: reboot the servers
  command: /sbin/reboot -t now
```

For more: http://docs.ansible.com/modules.html

Configuration- IV (cntd)

- MySQL Modules
  - mysql_db → Add remove databases to remote hosts
  - mysql_replication → Manage MySQL replication
  - mysql_user → MySQL user management
  - mysql_variables → Manage global variables
- Others Modules
  - Mongodb, postgresql
  - Package managers (yum, apt)
  - Service
  - File
  - Template

For more: http://docs.ansible.com/list_of_database_modules.html#mysql

Best practices – Ansible Vault

- ansible-vault
  - Key management (aes256 encryption)
    - Create new encrypted vault
      $ ansible-vault create system.yml
    - Editing encrypted key
      $ ansible-vault edit system.yml
    - Rekeying
      $ ansible-vault rekey system.yml
    - Encrypt unencrypted files
      $ ansible-vault encrypt system.yml
    - Decrypt encrypted files
      $ ansible-vault decrypt system.yml
    - Viewing decrypted files
      $ ansible-vault view system.yml
    - Playbook integration
      $ ansible-playbook -i clusters/test setup.yml --ask-vault-pass
    - File integration
      $ ansible-playbook -i clusters/test setup.yml --vault-password-file ~/.vault_pass.txt

For more: https://docs.ansible.com/playbooks_vault.html

Best practices – Templates

- Use of templates

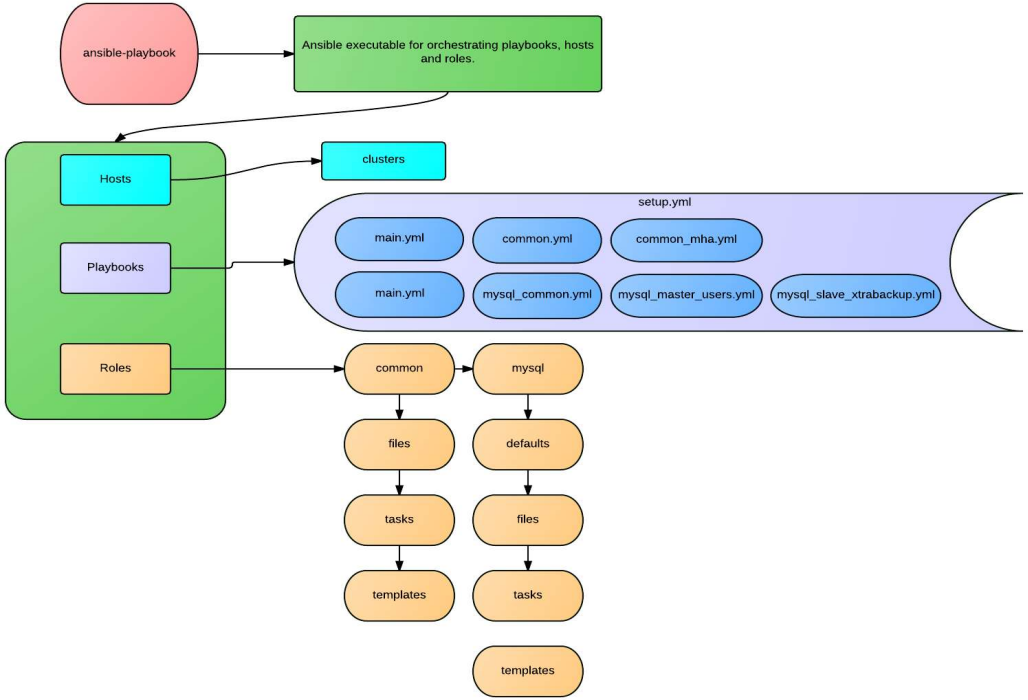
```
# MHA cluster configuration
# generated by Ansible, do not modify by hand.
# config for cluster: {{cluster_id}}
[server default]
user={{my_mha_user}}
password={{my_mha_pass}}
repl_user={{my_repl_user}}
repl_password={{my_repl_pass}}
ssh_user=root
manager_workdir=/var/log/masterha/{{cluster_id}}
remote_workdir=/var/log/masterha/{{cluster_id}}
...
#my.cnf
innodb_buffer_pool_size       = {{ (ansible_memtotal_mb * 70 / 100) |round|int }}M
…
```

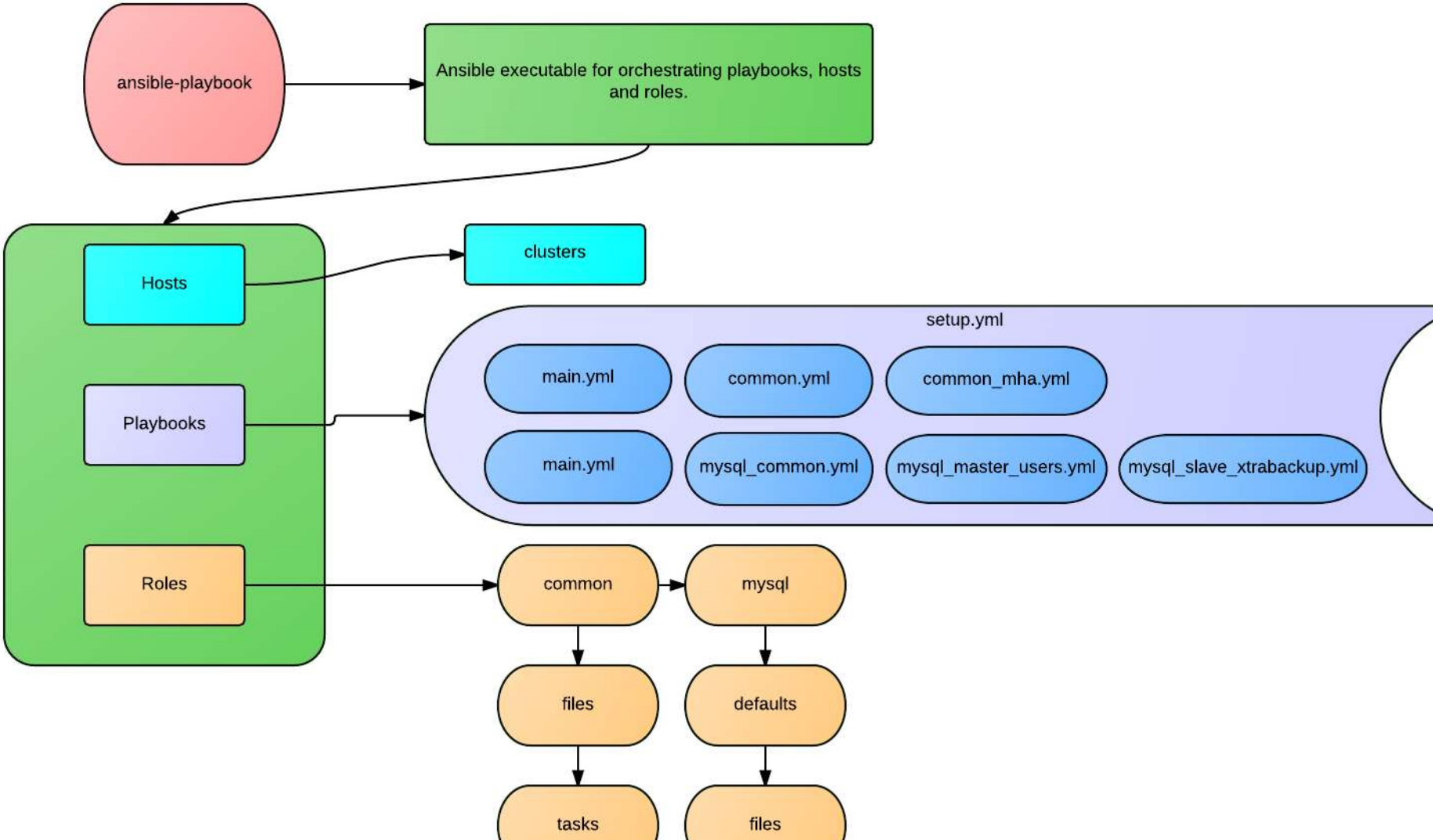
For more: https://github.com/mszel-pythian/ansible_mha/blob/master/roles/common/templates/etc/cluster.cnf

MySQL Use Cases

- Installation and deployments
- MySQL configuration management
- User management
- DB task management
  - Backup and Restores
  - Bootstrapping
- Database change management
- Database pool management
- Orchestration with other services

Ansible Workflow




ansible-playbook
Ansible executable for orchestrating playbooks, hosts and roles.
Hosts
clusters
Playbooks
setup.yml
main.yml
common.yml
common_mha.yml
main.yml
mysql_common.yml
mysql_master_users.yml
mysql_slave_xtrabackup.yml
Roles
common
mysql
files
defaults
tasks
files

Demo – https://github.com/mszel-pythian/ansible_mha

- Show configuration files and sample setup
- Demonstrate launching ec2 mysql instances configuring MHA and failing over with Ansible
  - SYSTEM SETUP(common role)
    - Fine tune system variables (sysctl)
    - Install system packages and mha
    - Create configuration files based on templates
    - Create users based on public keys under files/users
  - MYSQL PART(mysql role)
    - Install mysql binaries
    - Create my.cnf based on template (exception handling)
    - Install mysql users (replica,system users, monitor app users), remove passwordless users
    - Build slave automatically with xtrabackup streaming

Demo – (cntd)

```
roles/common/tasks/common_mha.yml
 - yum:  name=/root/mha4mysql-manager-0.56-0.el6.noarch.rpm state=present
    when: "mysql_role == 'mha_manager'"

TASK: [common | yum name=/root/mha4mysql-manager-0.56-0.el6.noarch.rpm state=present] ***
skipping: [54.163.66.141]
skipping: [54.161.225.49]
skipping: [54.166.98.113]
changed:  [54.157.195.13]

[…]

roles/mysql/tasks/main.yml:
- include: mysql_slave_xtrabackup.yml
  when: "bootstrap_enabled and mysql_role != 'master'"
  tags: slave

TASK: [mysql | Streaming the backup from {{ backup_src }} to {{ inventory_hostname }}] ***
skipping: [54.161.225.49]
changed: [54.166.98.113]
changed: [54.163.66.141]
```

Credits – Q & A

- Derek Downey @derek_downey Principal Consultant, Pythian
- Rick Pizzi DBA, Bravofly
- Narcis Pillao Devops, eDreams

- Contact us:
  - Alkin Tezuysal : @ask_dba, tr.linkedin.com/in/askdba/en
  - Mukka Szel : @42mukka, hu.linkedin.com/in/miklosszel/en

ABOUT PYTHIAN

10,000

Pythian currently manages more than 10,000 systems.

350

Pythian currently employs more than 350 people in 25 countries worldwide.

1997

Pythian was founded in 1997

- 200+ leading brands trust us to keep their systems fast, relaible, and secure
- Elite DBA & SysAdmin workforce: 7 Oracle ACEs, 2 Oracle ACE Directors, 5 Microsoft MVPs, 1 Cloudera Champion of Big Data, 1 Datastax Platinum Administrator — More than any other company, regardless of head count
- Oracle, Microsoft, MySQL, Hadoop, Cassandra, MongoDB, and more.
- Infrastructure, Cloud, SRE, DevOps, and application expertise
- Big data practice includes architects, R&D, data scientists, and operations capabilities
- Zero lock-in, utility billing model, easily blended into existing teams.