

Ansible VM Lifecycle Management

System Orchestration Tool

Toshaan Bharvani - VanTosh bvba

<toshaan@vantosh.com>



CfgMgmtCamp 2014



4 February 2014

Toshaan Bharvani - VanTosh

- From Antwerp, Belgium
- Self-employed engineer/trainer (available for hire)
<http://www.vantosh.com>
- Involved with Enterprise OS : RHEL, CentOS, IBM AIX, OpenBSD, SLES, ...
- Likes to keep everything secure : SELinux, WebSec, ...
- Lives in a virtual world : KVM, Xen, LXC, PowerVM, z/VM, ...
- Likes automation : Ansible, Puppet
- Works on both hardware and software side
- Wants to take over the world
- Twitter : [@toshywoshy](https://twitter.com/toshywoshy)
- Blog : <http://www.toshaan.com>

Table of contents

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

1 What is Ansible?

2 Inventory

3 Virtual Machines

4 DEMO

5 Conclusion

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

1

What is Ansible?

Introducing



“Ansible is a fictional machine capable of instantaneous or superluminal communication. Typically it is depicted as a lunch-box-sized object with some combination of microphone, speaker, keyboard and display. It can send and receive messages to and from a corresponding device over any distance whatsoever with no delay.”¹

- Configuration Management Tool
- System Orchestration Tool
- Remote Execution/Deployment Tool
- ...

¹Rocannon's World - Ursula K. Le Guin

An overview

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

- Python2 based
- Server based, agentless²
- uses SSH (can use accelerated mode uses a daemon and port)
- host information in flat files, CMDB, scripts, ...
- executes a task on the host side
- Playbook : combination of tasks with meta information
 - YAML
 - JSON
- Templates : Jinja2
- works where Python2 works³

² Abstraction of SSH and in certain setup an agent might be required, but by default it is not necessary

³ Ansible can actually run without Python on the remote host, however it is not fully supported

Internal Design

Toshaan
Bharvani -
VanTosh bvba

What is Ansible?

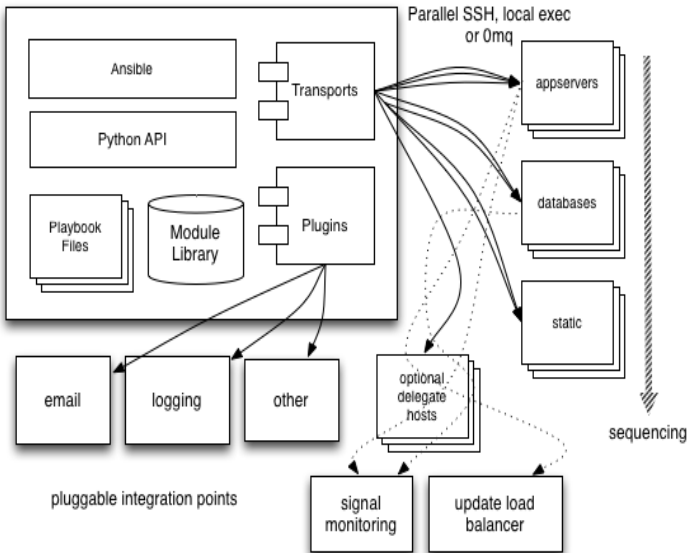
Inventory

Virtual Machines

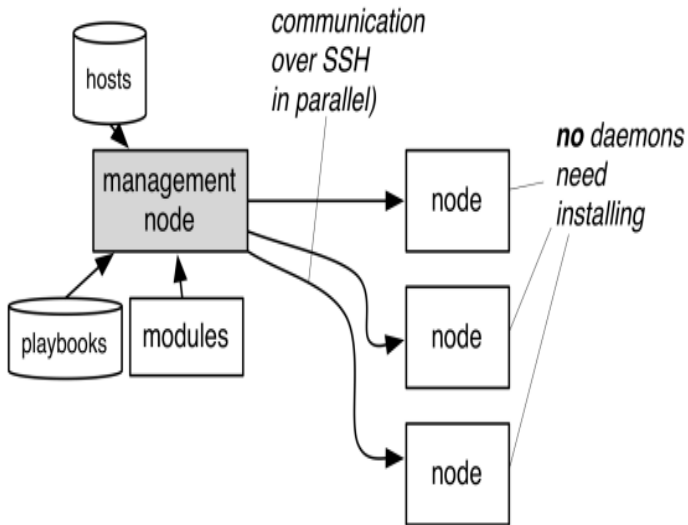
DEMO

Conclusion

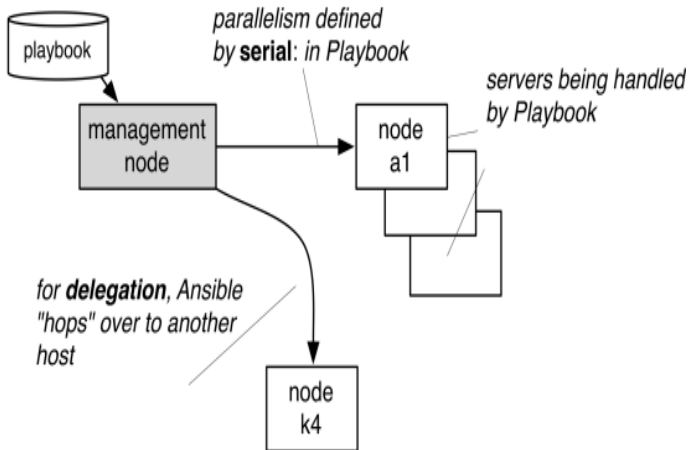
The End



Normal Adhoc Mode



Delegation Mode



What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

2

Inventory

- hosts file is by default in ini format

```
1 [hypervisors]
2   hypervisor0 ansible_ssh_host=hyper0.vantosh.com ansible_ssh_port=22221
3     ansible_ssh_user=ansible ansible_ssh_private_key_file=/path/to/my/private/
4       key0
5   hypervisor1 ansible_ssh_host=hyper1.vantosh.com ansible_ssh_port=22222
6     ansible_ssh_user=ansible ansible_ssh_private_key_file=/path/to/my/private/
7       key1
8   hypervisor2 ansible_ssh_host=hyper2.vantosh.com ansible_ssh_port=22223
9     ansible_ssh_user=ansible ansible_ssh_private_key_file=/path/to/my/private/
10      key2
11  hypervisor3 ansible_ssh_host=hyper3.vantosh.com ansible_ssh_port=22224
12    ansible_ssh_user=ansible ansible_ssh_private_key_file=/path/to/my/private/
13      key3
14
15 [virtualmachines]
16   vm0 ansible_ssh_host=vm0.vantosh.com ansible_ssh_port=22230
17     ansible_ssh_user=ansible ansible_ssh_private_key_file=/path/to/my/private/
18       key4
19   vm1 ansible_ssh_host=vm1.vantosh.com ansible_ssh_port=22231
20     ansible_ssh_user=ansible ansible_ssh_private_key_file=/path/to/my/private/
21       key5
22   vm2
23   vm3
```

Inventory - Virtual Machine (el6)

Toshaan
Bharvani -
VanTosh bvba

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

```

1 ---
2 hyper: hypervisor0
3 distro: centos6
4 rootpwd: $1$f0pPKH0e$0xrNcWX07Ki9DPmpcmJ7X.
5 virtualfilespace: /virtual/
6 disks:
7   - { path: /virtual/star-boot0.qcow2 , size: 512M }
8   - { path: /virtual/star-root0.qcow2 , size: 6G }
9   - { path: /virtual/star-swap0.qcow2 , size: 512M }
10  - { path: /virtual/star-swap1.qcow2 , size: 512M }
11 vmwaittime: 5
12 virtualcpus: 1
13 ramsize: 512
14 language: en_US
15 keyboard: us
16 timezone: "Europe/Brussels"
17 nics:
18   - { type: bridge , name: br0 , model: virtio }
19 networks:
20   - network --bootproto=dhcp --device=eth0 --onboot=on --hostname=star.
    vantosh.com
21 partitions:
22   - part /boot --ondisk=vda --asprimary --fstype="ext4" --fsoptions='defaults
    ,noatime,discard' --grow --size=1
23   - part pv.01 --ondisk=vdb --asprimary --grow --size=1
24   - volgroup VolGroupRoot --pesize=131072 pv.01
25   - logvol / --fstype="ext4" --fsoptions='defaults,noatime,discard' --name=
    LogVolRoot0 --vgname=VolGroupRoot --grow --size=1
26   - part swap --onpart=vdc --asprimary --fstype="swap" --fsoptions='defaults,
    discard' --grow --size=1
27   - part swap --onpart=vdd --asprimary --fstype="swap" --fsoptions='defaults,
    discard' --grow --size=1
28 bootloader: bootloader --location=mbr --driveorder=vda,vdb,vdc,vdd
29 sshdkeylength: 8192
30 users:
31   - { name: supervisor , id: 1000 , ssh: yes , sshpubkey: /home/toshywohy/.
    keys/id_star.pub }

```

Inventory - Virtual Machine (debian)

Toshaan
Bharvani -
VanTosh bvba

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

```
1 ---
2 hyper: hypervisor2
3 distro: debian7
4 locale: en_US.UTF-8
5 keyboard: us
6 timezone: Europe/Brussels
7 rootpwd: $1$aE.C1r1H$00/ReCFABgz49g2fvw02D.
8 virtualfilepath: /virtual/
9 disks:
10 - { path: /virtual/alien-boot0.qcow2 , size: 1G , name: vda }
11 - { path: /virtual/alien-root0.qcow2 , size: 9G , name: vdb }
12 - { path: /virtual/alien-home0.qcow2 , size: 9G , name: vdc }
13 - { path: /virtual/alien-swap0.qcow2 , size: 1G , name: vdd }
14 virtualcpus: 1
15 ramsize: 128
16 nics:
17 - { type: bridge , name: br1 , model: virtio }
18 networks:
19 - { name: eth0 , ipaddress: 192.168.122.142 , netmask: 255.255.255.0 ,
20   gateway: 192.168.122.241 , nameserver: 192.168.122.1 }
21 partitions:
22 - '512 10 2048 ext3 $defaultignoref { } $primaryf { } $bootablef { } method{ format
23   } format{ } use_filesystem{ } filesystem{ ext3 } mountpoint{ /boot }
24   options/noatime{ noatime } device{ /dev/vda } .'
25 - '500 10000 1000000000 ext4 method{ lvm } vg_name{ rootvg } device{ /dev/vdb
26   } .'
27 - '500 10000 1000000000 ext4 $lvmokf { } in_vg{ rootvg } lv_name{ rootlv0 }
28   method{ format } format{ } use_filesystem{ } filesystem{ ext4 } mountpoint{
29   / } options/noatime{ noatime } .'
30 - '500 10000 1000000000 ext4 method{ lvm } vg_name{ homevg } device{ /dev/vdc
31   } .'
32 - '500 10000 1000000000 ext4 $lvmokf { } in_vg{ homevg } lv_name{ homelv0 }
33   method{ format } format{ } use_filesystem{ } filesystem{ ext4 } mountpoint{
34   /home } options/noatime{ noatime } .'
35 - '512 10 2048 linux-swap method{ lvm } vg_name{ swapvg } device{ /dev/vdd }
36   .'
37 - '512 10 2048 linux-swap $lvmokf { } in_vg{ swapvg } lv_name { swaplv0 }
38   method{ swap } format{ } device{ /dev/vdd } .'
39 vmwaittime: 7
```

3

Virtual Machines

Playbooks - el6

Toshaan
Bharvani -
VanTosh bvba

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

```
1 ---
2 - name: install-vm-el6
3   hosts: "{{ host }}"
4   vars_files:
5     - "vars/distros/{{ distro }}.yml"
6   gather_facts: no
7   sudo: yes
8   pre_tasks:
9     - local_action: slurp src={{ ansible_ssh_private_key_file }}.pub
10     sudo: no
11     register: sshpubkey
12     - action: qemu-img dest={{ item.path }} size={{ item.size }} format="qcow2"
13       options="preallocation=metadata"
14       with_items: disks
15       delegate_to: "{{ hyper }}"
16     - action: template src="{{ ansible_playbook_dir }}/templates/el6/kickstart.cfg"
17       dest="{{ virtualfiles_path }}/{{ inventory_hostname }}.cfg"
18       delegate_to: "{{ hyper }}"
19     - action: template src="{{ ansible_playbook_dir }}/templates/common/install-vm.sh"
20       dest="{{ virtualfiles_path }}/{{ inventory_hostname }}-create-vm.sh"
21       owner=root group=root mode=770
22       delegate_to: "{{ hyper }}"
23     - action: command /bin/bash {{ virtualfiles_path }}/{{ inventory_hostname }}-
24       create-vm.sh
25       delegate_to: "{{ hyper }}"
26       register: createdvm
27     - local_action: pause minutes={{ vmwaittime }}
28     - action: template src="{{ ansible_playbook_dir }}/templates/common/minram.sh" dest="{{
29       virtualfiles_path }}/{{ inventory_hostname }}-minram.sh" owner=root group=
30       root mode=770
31       delegate_to: "{{ hyper }}"
32       when: ramsize < minram
33     - action: command /bin/bash {{ virtualfiles_path }}/{{ inventory_hostname }}-
34       minram.sh
35       delegate_to: "{{ hyper }}"
36       when: ramsize < minram
37     - action: virt guest={{ inventory_hostname }} command=start
38       delegate_to: "{{ hyper }}"
39     ignore_errors: yes
```

Playbooks - debian

Toshaan
Bharvani -
VanTosh bvba

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

```
1 ---
2 - name: install-vm-debian
3   hosts: "{{ host }}"
4   vars_files:
5     - "vars/distros/{{ distro }}.yml"
6   gather_facts: no
7   sudo: yes
8   pre_tasks:
9     - local_action: slurp src={{ ansible_ssh_private_key_file }}.pub
10     sudo: no
11     register: sshpubkey
12     - action: qemu-img dest={{ item.path }} size={{ item.size }} format="qcow2"
13       options="preallocation=metadata"
14       with_items: disks
15       delegate_to: "{{ hyper }}"
16     - action: template src="templates/debian/post-preseed.sh" dest="{{ webpath
17       }}{{ inventory_hostname }}.sh" owner=apache group=apache mode=666 setype=
18       "httpd_sys_content_t"
19       delegate_to: "{{ webserver }}"
20     - action: template src="/.ansible/playbooks/templates/debian/minimal-
21       preseed.cfg" dest="{{ virtualfilespace }}{{ injectfile }}"
22       delegate_to: "{{ hyper }}"
23     - action: template src="/.ansible/playbooks/templates/common/install-vm.sh
24       " dest="{{ virtualfilespace }}{{ inventory_hostname }}-create-vm.sh"
25       owner=root group=root mode=770
26       delegate_to: "{{ hyper }}"
27     - action: command /bin/bash {{ virtualfilespace }}{{ inventory_hostname }}-
28       create-vm.sh
29       delegate_to: "{{ hyper }}"
30     register: createdvm
31     - local_action: pause minutes={{ vmwaittime }}
32     - action: template src="templates/common/minram.sh" dest="{{
33       virtualfilespace }}{{ inventory_hostname }}-minram.sh" owner=root group=
34       root mode=770
35       delegate_to: "{{ hyper }}"
36     when: ramsize < minram
37     - action: command /bin/bash {{ virtualfilespace }}{{ inventory_hostname }}-
38       minram.sh
39       delegate_to: "{{ hyper }}"
```



```
1 ---
2 distroname: centos6
3 distrotype: rhel6
4 minram: 512
5 location: "http://be.mirror.eurid.eu/centos/6/os/x86_64/"
6 repos:
7   - { name: "CentOS-base", uri: "http://be.mirror.eurid.eu/centos/6/os/x86_64/"
8     , cost: 100 }
9   - { name: "CentOS-updates", uri: "http://be.mirror.eurid.eu/centos/6/updates/
10     x86_64/", cost: 200 }
11   - { name: "CentOS-fasttrack", uri: "http://be.mirror.eurid.eu/centos/6/
12     fasttrack/x86_64/", cost: 300 }
13   - { name: "CentOS-extras", uri: "http://be.mirror.eurid.eu/centos/6/extras/
14     x86_64/", cost: 400 }
15 textargs: 'text ks=file:/{ inventory_hostname }.cfg console=ttyS0,115200
16   headless noshell nofirewire'
```

Variables - debian

```
1 ---
2 distroname: debian7
3 distrotype: debianwheezy
4 debianname: wheezy
5 minram: 256
6 injectfile: preseed.cfg
7 location: http://be.mirror.eurid.eu/debian/dists/wheezy/main/installer-amd64/
8 mirrorcountry: be
9 mirrorurl: ftp.be.debian.org
10 mirrordir: /debian
11 textrargs: "auto=true DEBIAN_FRONTEND=text noshell fb=false console=ttyS0
12           ,115200 lowmem"
13 webserver: mangal
14 webpath: /var/www/virtual/vantosh.com/ks/
15 weburl: http://ks.vantosh.com/
```

```
1 ---
2 distroname: debian6
3 distrotype: debiansqueeze
4 debianname: squeeze
5 minram: 256
6 injectfile: preseed.cfg
7 location: http://be.mirror.eurid.eu/debian/dists/squeeze/main/installer-amd64/
8 mirrorcountry: be
9 mirrorurl: ftp.be.debian.org
10 mirrordir: /debian
11 textrargs: "auto=true DEBIAN_FRONTEND=text noshell fb=false console=ttyS0
12           ,115200 lowmem"
13 webserver: mangal
14 webpath: /var/www/virtual/vantosh.com/ks/
15 weburl: http://ks.vantosh.com/
```

Qemu module

Toshaan
Bharvani -
VanTosh bvba

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

- Not in core
- Extended Jeroen Hoekx qemu-img module
 - added options value
 - sizing options more granual
 - resize is not automaticly

Install script

```
1  #!/bin/bash
2
3  if [ ! -f /etc/libvirt/qemu/{ inventory_hostname }.xml ]; then
4
5  virt-install \
6      --name={ inventory_hostname } \
7      --vcpus={ virtualcpus } \
8  {% if minram is defined and ramsize < minram %}
9      --ram={ minram } \
10 {% else %}
11     --ram={ ramsize } \
12 {% endif %}
13     --hvm \
14     --accelerate \
15     --os-variant={ distrotype } \
16 {% for disk in disks %}
17     {% if disk.size[-1:] == 'T' %}
18         {% set disk_size = (disk.size[:-1]|float) * 1024 %}
19     {% elif disk.size[-1:] == 'G' %}
20         {% set disk_size = (disk.size[:-1]|float) %}
21     {% elif disk.size[-1:] == 'M' %}
22         {% set disk_size = (disk.size[:-1]|float) / 1024 %}
23     {% elif disk.size[-1:] == 'K' %}
24         {% set disk_size = (disk.size[:-1]|float) / 1024 / 1024 %}
25     {% else %}
26         {% set disk_size = (disk.size[:-1]|float) %}
27     {% endif %}
28     --disk path={ disk.path },device=disk,size={ disk_size },cache=writeback,
29         format=qcow2,io=threads,bus=virtio \
30 {% endfor %}
31 {% for nic in nics %}
32     --network {{ nic.type }}={{ nic.name }},model={{ nic.model }} \
33 {% endfor %}
34     --location={ location } \
35 {% if injectfile is defined %}
36     --initrd-inject={ virtualfilepath }{{ injectfile }} \
37 {% else %}
38     --initrd-inject={ virtualfilepath }{{ inventory_hostname }}.cfg \
39 {% endif %}
```

Kickstart file

```
1 # config
2 install
3 cmdline
4 skipx
5 reboot
6 url --url={{ location }}
7 # authentication
8 rootpw --iscrypted {{ rootpwd }}
9 auth --usesshadow --passalgo=sha512
10 firewall --enabled --service=ssh
11 selinux --enforcing
12 # localisation
13 lang {{ language }}
14 keyboard {{ keyboard }}
15 timezone --isUtc {{ timezone }}
16 # network
17 {% for network in networks %}
18 {{ network }}
19 {% endfor %}
20 # partition
21 zerombr
22 clearpart --all --initlabel
23 {% for partition in partitions %}
24 {{ partition }}
25 {% endfor %}
26 {{ bootloader }}
27 # first booting
28 firstboot --disable
29 logging --level=info
30 reboot
31 # repositories
32 {% for repo in repos %}
33 repo --name={{ repo.name }} --baseurl={{ repo.uri }} --cost={{ repo.cost }}
34 {% endfor %}
35 # package selection
36 %packages --nobase --excludedocs
37 @core
38 %end
39 # post script
```

Preseed file

```
1  ### Installer
2  d-i debian-installer/splash boolean false
3  d-i debian-installer/consoledisplay string console-setup
4  debconf debconf/frontend select readline
5
6  ### Localization
7  d-i debian-installer/locale string {{ locale }}
8  d-i debian-installer/keymap select {{ keyboard }}
9  d-i keymap select {{ keyboard }}
10 d-i console-setup/ask_detect boolean false
11 d-i console-setup/layoutcode string {{ keyboard }}
12
13 ### Host name configuration
14 d-i netcfg/get_hostname string {{ inventory_hostname }}
15 d-i netcfg/get_hostname seen false
16 d-i netcfg/get_hostname priority {{ inventory_hostname }}
17 d-i netcfg/get_domain string {{ domain }}
18
19 ### Network configuration
20 {% for network in networks %}
21 d-i netcfg/choose_interface select {{ network.name }}
22 {% if network.dhcp is defined %}
23 d-i netcfg/disable_autoconfig boolean false
24 d-i netcfg/disable_dhcp boolean false
25 {% else %}
26 d-i netcfg/dhcp_options select Configure network manually
27 d-i netcfg/disable_dhcp boolean true
28 d-i netcfg/confirm_static boolean true
29 d-i netcfg/get_ipaddress string {{ network.ipaddress }}
30 d-i netcfg/get_netmask string {{ network.netmask }}
31 d-i netcfg/get_gateway string {{ network.gateway }}
32 d-i netcfg/get_nameservers string {{ network.nameserver }}
33 {% endif %}
34 {% endfor %}
35
36 ### Mirror settings
37 d-i mirror/protocol string http
38 d-i mirror/country string {{ mirrorcountry }}
39 d-i mirror/http/hostname string {{ mirrorurl }}
```

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

Post-preseed file

Toshaan
Bharvani -
VanTosh bvba

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

```
1 #!/bin/sh
2 TARGET='/target'
3 ### Go into the machine environment
4 chroot $TARGET
5 ### OpenSSH Settings
6 /bin/sed 's/\Port\ 22/Port\ {{ ansible_ssh_port }}/' -i /etc/ssh/sshd_config
7 /bin/sed 's/\LoginGraceTime\ 120/LoginGraceTime\ 60/' -i /etc/ssh/sshd_config
8 /bin/sed 's/\PermitRootLogin\ yes/PermitRootLogin\ no/' -i /etc/ssh/sshd_config
9 /bin/sed 's/UsePAM\ yes/UsePAM\ yes\nAllowUsers\ ansible/' -i /etc/ssh/
  sshd_config
10 /bin/mkdir /home/ansible/.ssh/
11 /bin/chmod 700 /home/ansible/.ssh/ ; \
12 /bin/echo "{{ sshpubkey.content|b64decode }}" > /home/ansible/.ssh/
  authorized_keys ; \
13 /bin/chmod 600 /home/ansible/.ssh/authorized_keys ; \
14 /bin/chown -R 999999.999999 /home/ansible/.ssh/
15 {# #/usr/bin/ssh-keygen -q -b {{ sshdkeylength }} -t rsa -f /etc/ssh/
  ssh_host_rsa_key -C '' -N '' #}
16 ### Sudo Settings
17 /bin/echo "ansible    ALL=(ALL)        NOPASSWD: ALL" > /etc/sudoers.d/ansible
18 chmod 440 /etc/sudoers.d/ansible
19 ### Delete unnecessary users
20 /usr/sbin/userdel games
21 /usr/sbin/userdel list
22 /usr/sbin/userdel irc
23 /usr/sbin/userdel proxy
24 /usr/sbin/userdel backup
25 /usr/sbin/userdel gnats
26 /usr/sbin/userdel news
27 exit
```

```
1 - name: create user
2   action: user name={{ item.name }} uid={{ item.id }}
3   with_items: users
4 - name: copy ssh public key
5   action: authorized_key user={{ item.name }} key="{{ lookup('file','item.
6     sshpubkey') }}"
   with_items: users
```


4

DEMO

Demo

Toshaan
Bharvani -
VanTosh bvba

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

```
[toshywoshy@localhost]ansible$ ansible-playbook ~/.ansible/playbooks/install-vm-el6.yml
```

```
< PLAY [install-vm-el6] >
```



```
skipping: no hosts matched
```

```
< PLAY RECAP >
```



```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

```
[toshywoshy@localhost]ansible$
```

5

Conclusion

Automation **MUST** [RFC2119] be easy



More information

What is Ansible?

Inventory

Virtual Machines

DEMO

Conclusion

The End

- Ansible : <http://www.ansible.com/>
- Documentation : <http://docs.ansible.com/>
- Ansible Galaxy : <http://galaxy.ansible.com/>
- Github : <https://github.com/ansible/ansible>
- Ansible Install VM :
<https://github.com/toshywoshy/ansible-vm-install>

The End



Thank You



Toshaan Bharvani - VanTosh bvba <toshaan@vantosh.com>

<http://www.vantosh.com/>

Made with Beamer L^AT_EX
a T_EXbased Presentation program