IT Automation with

ANSIBLE

Rayed Alrashed

About Me

- 1993 - 1997 KSU
- 1997 - 1999 ISU KACST
- 1999 - 2001 GWU
- 2001 - 2007 SAUDI NET
- 2008 - 2011 CITC
- 2011 - Now WireFilter

Linux Admin Accounts

- root user
  - Superuser, can do anything
  - Dangerous, please don't use it!
- sudo
  - Better accountability
  - Fine tune permissions

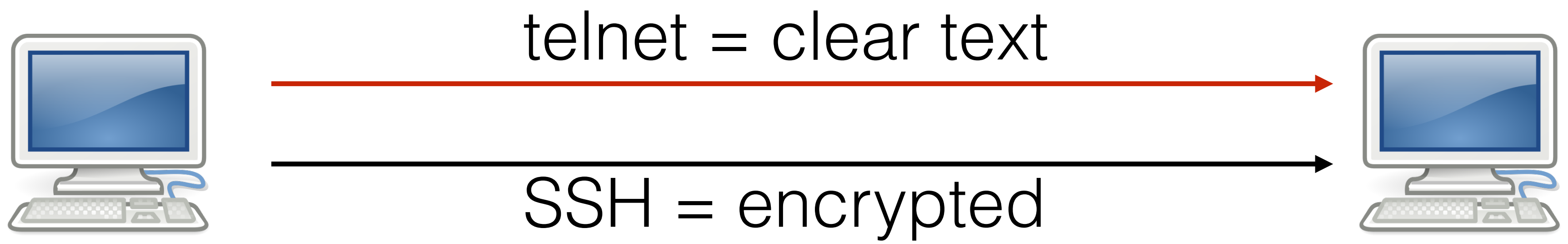
```
root# rm /var/db/mysql
```

```
user1$ sudo rm /var/lib/mysql
Password:
:
user1$ sudo rm /var/lib/postgresql
… no password for few minutes …
```

```
user1$ sudo visudo
:
# Members of the admin group may gain root privileges
%admin ALL=(ALL) ALL
:
Cmnd_Alias APTITUDE = /usr/bin/aptitude update, /usr/
bin/aptitude upgrade
user1 ALL=(ALL) NOPASSWD: APTITUDE

user1$ sudo aptitude update
… no password needed!
```

What is SSH



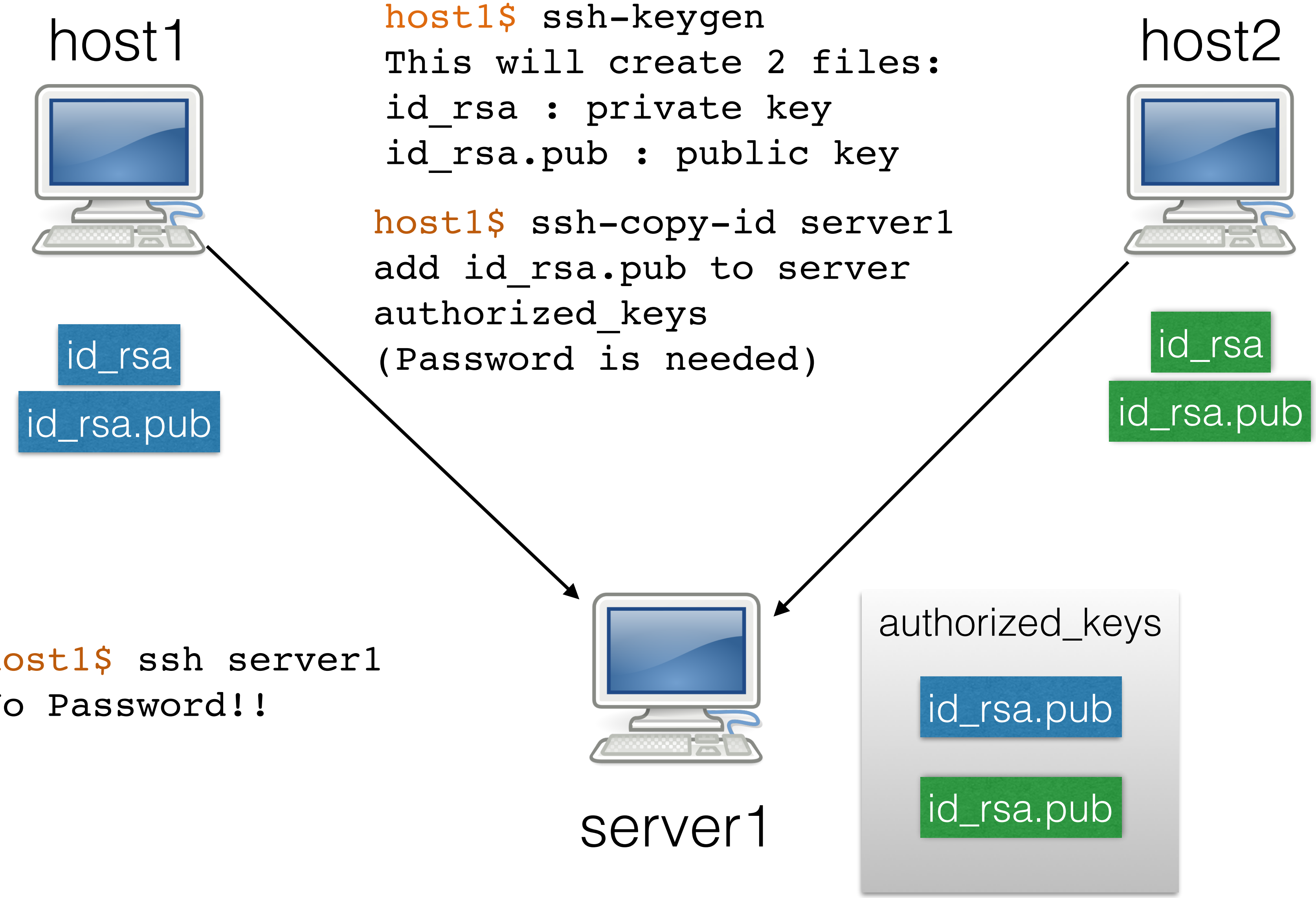
- SSH have more goodies:
  - Access using Keys / Password less
  - Compression
  - Secure File Transfer (scp, sftp)
  - Tunneling

SSH is acronym for Secure Shell

SSH Keys

```
host1$ ssh-keygen
This will create 2 files:
id_rsa : private key
id_rsa.pub : public key
```

```
host1$ ssh-copy-id server1
add id_rsa.pub to server
authorized_keys
(Password is needed)
```



```
host1$ ssh server1
No Password!!
```

Poor Man’s Administration

- Connecting to each server one by one
- Time consuming
- Repetitive & error prone
- Not Reproducible
- No way to track changes!

```
$ ssh www1.example.com
www1$ sudo vi /etc/resolv.conf
www1$ sudo apt-get install nginx
:
$
$ ssh www2.example.com
www2$ sudo vi /etc/resolv.conf
www2$ sudo apt-get install nginx
:
$
$ ssh www3.example.com
www3$ sudo vi /etc/resolv.conf
www3$ sudo apt-get install nginx
:
:
: etc …
```

Poor Man’s Automation

- Loop in a shell script
- Hard to write
- Hard to maintain
- Error prone

```
#!/bin/sh

HOSTS="
www1.rayed.com
www2.rayed.com
www3.rayed.com
db1.rayed.com
db2.rayed.com
"

for host in $HOSTS
do
	# Copy DNS settings to all servers
	scp resolv.conf  $host:/etc/resolv.conf

	# Install Nginx
	ssh $host “sudo apt-get install nginx”
done
```

What is Ansible?

- IT Automation Tool
- Open Source / Commercial support available
- No server on Management Node
- No agent on Managed Nodes
- Uses ssh; no special ports, passwords, or keys
- No need to install on dedicated machine
- Easy to Install, Learn and Use

Installation

- Linux:
```
$ sudo easy_install pip
$ sudo pip install ansible
```

- OSX:
```
$ brew update
$ brew install ansible
```

Inventory

- List of machine you want to manage
- Location:
    - Default: /etc/ansible/host
    - export ANSIBLE_HOST=my_hosts
    - Use -i option: ansible -i my_hosts
    - Defined in ansible.cfg
- Dynamic Inventory: Ask AWS, Linode, DigitalOcean, your own script!

```
# file: ansible_hosts
mail.example.com

[webservers]
www[1:5].example.com

[dbservers]
db-[a:d].example.com
```

```
# file: ansible.cfg
[defaults]
hostfile = ./ansible_hosts
```

Ad-Hoc Commands

Ad-Hoc Commands

- Do something quick, not worth saving!
- Not worth writing a Playbook for
- e.g.: shutdown a lab!
- Examples:

```
ansible all -i ansible_hosts -m ping
ansible all -m ping
ansible webservers -m ping
ansible www1.example.com -m ping

ansible all -m command —a date
ansible all -a date

ansible all -a reboot
ansible all -a reboot -s
ansible all -a reboot -s -K
```

module: ping

- Check connectivity
- If you can ssh you can ping:
  $ ssh user@host
- You can specify group or “all”
- Execute in parallel

```
$ ansible webservers -m ping
www1.example.com | success >> {
    "changed": false,
    "ping": "pong"
}
$ ansible www404.example.com -m ping
www404.example.com | FAILED => SSH encountered an unknown error during
the connection. We recommend you re-run the command using -vvvv, which
will enable SSH debugging output to help diagnose the issue
```

module: setup

- Get tons of information about the machine
- Name, Disks, IP, OS version, etc …
- Can be used for conditional operations

```
$ ansible www1.example.com -m setup
www1.example.com | success >> {
    "ansible_facts": {
        "ansible_all_ipv4_addresses": [
            "178.79.182.89"
        ],
        "ansible_all_ipv6_addresses": [
            "2a01:7e00::f03c:91ff:fe70:5c6a",
            "fe80::f03c:91ff:fe70:5c6a"
        ],
        "ansible_architecture": "x86_64",
        "ansible_bios_date": "NA",
        "ansible_bios_version": "NA",
:
```

module: command

- Execute command on remote machine
- e.g. reboot

```
$ ansible www1.example.com -m command -a “echo hello”
www1.example.com | rc=0 >> {
hello
$ ansible www1.example.com -a “echo hello”
www1.example.com | rc=0 >> {
hello
```

module: apt

- Package management for Debian & Ubuntu
- Install, Uninstall, Update
- There is also “yum” module for RedHat, CentOS, and Fedora.
- You might need:
  - -s : command need sudo
  - -K : Ask for sudo password

```
$ ansible www1.example.com -m apt -a “name=nginx state=present”

$ ansible www1.example.com -m apt -a “update_cache=yes upgrade=safe”
```

Other Interesting Modules

- user: Manage user accounts
- lineinfile: Ensure a particular line is in a file, or replace an existing line using a back-referenced regular expression.
- copy: Copies files to remote locations.
- template: Templates a file out to a remote server.

Other Interesting Modules

- authorized_key: Adds or removes an SSH authorized key
- service: Manage services, start/stop/restart/ restart on reboot.
- mysql_db, mysql_user, postgresql_db, postgresql_user: Can you guess it!
- git: Deploy software (or files) from git checkouts

Playbooks

What is a Playbook

- Ansible's configuration, deployment, and orchestration language.
- Modules are the tools in your workshop, Playbooks are your design plans.
- YAML!

```
---
# An employee record
name: Example Developer
job: Developer
skill: Elite
employed: True
foods:
    - Apple
    - Orange
    - Strawberry
    - Mango
languages:
    ruby: Elite
    python: Elite
    dotnet: Lame
```

Playbook Example

my_playbook.yml

```
---
- hosts: webservers
  #remote_user: root
  sudo: yes
  tasks:
  - name: Install Nginx
    apt: name=nginx state=present
  - name: Copy static site
    copy: src=files/my_site dest=/var/www
  - name: Configure Nginx
    template: src=files/nginx_site.conf dest=/etc/nginx/new_site.conf
    notify: my_nginx_reload
  handlers:
  - name: my_nginx_reload
    service: name=nginx state=restarted
```

Execute Playbook

```
ansible-playbook my_playbook.yml -K
```

Variables

- Defined
  - Inventory
  - Playbook
- Discovered (Facts)
- Use

```
# inventory file
host1 http_port=80

[webservers:vars]
http_port=80
```

```
# playbook
- hosts: webservers
  vars:
    http_port: 80
```

```
# facts
:
"ansible_distribution": "Ubuntu",
"ansible_distribution_release": "precise",
"ansible_distribution_version": “12.04",
:
```

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

```
# in template files
server {
    listen 80;
    root /var/www/my_site;
    index index.html index.htm;
    server_name {{ ansible_default_ipv4.address }};
}
```

Conditions

- Use Variables & Facts
- Conditional Tasks
- Conditional Includes
- Conditional Roles

```
- name: Install Apache (Ubuntu)
  apt: name=apache state=latest
  when: ansible_os_family == ‘Debian’

- name: Install Apache (CentOS)
  yum: name= httpd state=latest
  when: ansible_os_family == ‘RedHat’
```

```
- include: tasks/sometasks.yml
  when: "'reticulating splines' in output"
```

```
- hosts: webservers
  roles:
     - { role: debian_stock_config, when: ansible_os_family == 'Debian' }
```

Loops

Other Loop Types Available

```
# Without Loops
  - name: Install Packages
    apt: name= fail2ban state=present
  - name: Install Packages
    apt: name= apticron state=present
  - name: Install Packages
    apt: name= git state=present
  - name: Install Packages
    apt: name= figlet state=present
  - name: Install Packages
    apt: name= nginx state=present
```

```
# With Loops
  - name: Install Packages
    apt: name={{item}} state=present
    with_items:
    - iptables-persistent
    - fail2ban
    - exim4-daemon-light
    - apticron
    - git
    - figlet
    - nginx
```

```
# Loop with Hash (Dictionary)
- name: add several users
  user: name={{ item.name }} state=present groups={{ item.groups }}
  with_items:
    - { name: 'testuser1', groups: 'wheel' }
    - { name: 'testuser2', groups: 'root' }
```

Vault

- Ansible + GIT
- What about passwords?

```
ansible-vault create site.yml
ansible-vault edit site.yml
```

```
$ANSIBLE_VAULT;1.1;AES256
3537313361306232363662353666643939653165666231326232656235326137643534393434646433
356333353233336230343032366631393137613862343737380a623461636265633561313064313564
3766656130666166323732346634316665373863376538366638306639623464653963356537363 6
396164373136313034 0a33646566633463383933306135643931623732326263336461303762316 4
3965
```

```
ansible-playbook site.yml —ask-vault-pass
ansible-playbook site.yml --vault-password-file ~/.vault_pass.txt
```

“A lazy sysadmin is the best admin”

–Anonymous

More

- http://www.ansible.com/
- http://docs.ansible.com/
- https://galaxy.ansible.com/
- http://docs.ansible.com/list_of_all_modules.html