Automated server configuration with

Ansible

by Gábor Szabó

Automated Configuration Management using Ansible

Gábor Szabó

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This version was published on 2019-04-16

Contents

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[1]https://leanpub.com/u/szabgab
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Preface

This is an early edition of the book. A lot will change and as I release new editions you'll be notfied and you'll be able to download the newer editions. I am also going to include a list of changes to make it easier for you to read the parts that have change without wasting time re-reading parts that remaind the same.

Cover image is from Canva.

Ansible is a software product distributed under the GNU GPLv3 open source license.

About Ansible

Ansible is one of the Open Source Configiguration Management tools that allow system administrators to manage hunders or thousands of servers. In this book we'll start by setting up an envionment where you can experiment with Ansible.

Ansible itself does not run on MS Windows, we start by setting up Linux boxes in a Virtual environment on your computer.

Questions and Error reporting

If you have questions regarding the content of thos book, or if you have suggestions what to include. Or if you found an error you wish was corrected, feel free to contact me via email: Gabor Szabo gabor@szabgab.com.

Thanks

This is the place where I am going to thank people who have read the eBook and made constructive comments.
First of all let me thank Yonit Gruber-Hazani[3], my co-conspirator running the DevOps Workshops[4]. Her input was enourmous.

I'd also like to thank all the attendees of the workshop. Without you there would be no point in preparing the content!

Dave Pinchevski[5] helped with the explanation about man-in-the-middle attack.

---

[3]https://www.linkedin.com/in/yonitgruber/
[4]http://devops-workshops.code-maven.com/
[5]https://www.linkedin.com/in/djpinchevski/

Changes

Remove the newlines from the paragraph text to fit the expectatoon of Markua.

v0.04 2019-04-16

- New entries:
  * Print debugging statement
  * Stop and disable apt-get using Ansible

v0.03 2018-03-26

- Updated entries:
  * Reboot using Ansible
- New entries:
  * Install and configure Nginx using Ansible
  * Installing Perl and CPAN modules using Ansible

v0.02 2018-03-20

- Updated entries:
  * Man-in-the-middle attack in VirtualBox host-only network - ssh to remote machine
- New entries:
  * Setup for Learning Ansible
  * Reboot using Ansible
  * Waiting with Ansible, pausing a Playbook

v0.01 2018-03-17

- Initial release

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@ WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED! @

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Setup for Learning Ansible

In order to Learn Ansible you'll need to be familiar with at least the basics of Linux on the command line and you'll need to have a few Linux boxes to experiment with.

Minimum Linux knowledge

- File-system operations: creating, listing, moving, removing, editing files. * Using ping, ssh, sudo * Configuring Nginx

You can use the [Linux mini-series](#) of articles to learn these.

Linux boxes to experiment with

You'll need 3 (or more) Linux machines for each setup to use as host and one machine (either Linux or OSX) to run Ansible.

Your Options: Having a local installation or using machines in the cloud.

MS Windows

If you have MS Windows on your computer:

Option one is to create 4 Virtual Machines on the computer you work on. 1 where you'll install and run Ansible and 3 to act as hosts you manage.

Option two is to create 1 Virtual Machine on the computer you work on and use 3 VPS (Virtual Private Server) in the cloud. On the local Virtual Machine you'll install and run Ansible. You will manage the 3 VPS-es.

OSX or Linux

If you run Linux or OSX then it can be used as the machine where you install and run Ansible so you only need the 3 host machines. Those can be either local, inside Virtual Box, or they can be remote. Using some VPS.

Virtual Linux boxes locally

IMHO The best option is to create the 4 Linux boxes in a VirtualBox image locally. That will allow you to use them anywhere and they don't cost you anything. Follow the Linux mini-series explaining how to install Ubuntu Linux on VirtualBox and how to configure the network. If you already have a Linux Box in VirtualBox then start reading how to setup two Virtual Linux boxes.

Virtual Private Server (VPS)

As for cloud-based VPS, there are several providers. One I use often is Digital Ocean[6].

Visit Digital Ocean[7] using this ref-code. If you don't have an account yet, sign up. The ref-code is supposed to give you $10 credit which is plenty as you can run a VPS by the hour and pay only $0.007/hr. I might be mistaken, but as I understand at this point you'll either need to pay $5 via PayPal or provide a Credit Card that will be only charged after you run out of the $10 initial credit.

If you don't have yet, create an ssh Private/Public pair on the machine you'll use to run Ansible. (Either your Linux machine or OSX notebook, or the VirtualBox you have created for this.)

Ansible

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Installing Ansible

Before you can start using Ansible you need to install it on the management machine.

Ansible runs on Linux/Unix machines including Mac OSX. (There is no plan to port it to run on MS Windows.) This is the manegement machine.

It can control (manage) both Linux/Unix machines and boxes running MS Windows.

Your notebook or some in-house machine in the company can work. If you only have Windows machines you can install Linux as a virtual environment. e.g. Ubuntu Linux in VirtualBox.

One thing you need to remember about security is that the user who can run ansible will have virtually unlimited control of all your servers. So make sure the account that is set up to run ansible has adequate authentication set up.

I am setting it up on my Macbook air in my own account. I am going to use my own public key to allow me access to the privileged user on the servers. I'd better not share my private key with anyone then.

There are a number of ways to install Ansible[8].

---

[6]https://code-maven.com/digitalocean
[7]https://code-maven.com/digitalocean
[8]http://docs.ansible.com/ansible/latest/intro_installation.html

Ansible is written in Python and as I already have Python 3 installed on my machine I went with `virtualenv` and `pip` here.

Setting up Virtualenv on Ubuntu 17.04

If you have a bare-bones Ubuntu 17.04 then this is how you set up a virtualenv for python3:

```
1  $ sudo apt-get install virtualenv python3-virtualenv python3-pip
2  $ virtualenv venv --python=python3
3  $ source venv/bin/activate
```

Setting up Ansible on Ubuntu 17.04

```
1  $ virtualenv venv
2  $ source venv/bin/activate
3  $ pip install ansible
```

After a while I had Ansible installed.

```
1  $ ansible --version
```

Shows the version number of Ansible. (I have 2.4.1.0) with some additional information.

```
1  $ ansible -h
```

provides help. It lists many of the parameters we can use with the `ansible` command.

More to come soon.

Ansible logo

Getting Started with Ansible managing CentOS on Digital Ocean

In this example we'll take a freshly installed Linux box running CentOS 7.4 on a Digital Ocean droplet[9] and use Ansible to make basic configurations.

I assume that you already have Ansible installed on your desktop/notebook, whatever machine is in front of you. If not, check out the linked article.

Create the host machine on Digital Ocean

For this article I've created the host machine manually.

Visit Digital Ocean[10], sign up if you don't have an account yet. (Using that link you are supposed to get $10 credit).

If you have not done so yet, Create an ssh keypair and upload the public key under the "SSH keys" section of the Security[11] of your Profile[12]. This will be useful as this will allow you to connect to the remote host without providing a password.

Now, in order to create your first Droplet, visit the list of droplets[13] and click on the "Create" button and select "Droplets".

- Select `CentOS 7.4 64 bit` as that's what we are checking out now. For size select the smallest. Even that is way to big for our needs. * For `datacenter` select whatever you like. I usually just select New York 1. * "Select additional options" can be left alone for now. * At "Add your SSH keys" you should see the SSH key you added earlier. Select the checkbox next to it. * Make sure you are asking for 1 Droplet. * The hostname can be anything now. Even the one they offer. * Click "Create".

After about 30 second your Droplet will be ready.

Name	IP Address	Created ▲	Tags	
centos-s-1vcpu-1gb-nyc1-01 1 GB / 25 GB Disk / NYC1 - CentOS 7.4 x64	159.65.236.52	Happy coding!		More ⌄

Hover over the IP address and a link `copy` will appear. Click on that to get the IP address in your clipboard. If you can paste from there in your editor then you can save some extra work.

Create a file called `inventory.cfg` with the following content, just use the IP address of your Droplet instead of mine:

---

[9]https://code-maven.com/digitalocean
[10]https://code-maven.com/digitalocean
[11]https://cloud.digitalocean.com/settings/security
[12]https://cloud.digitalocean.com/settings/profile
[13]https://cloud.digitalocean.com/droplets

```
1  [all]
2  159.65.236.52
```

The "inventory file" of Ansible is a single configuration file that holds all the hosts you'd like to manage. The hosts can be grouped in various ways, but now as we only have one machine we created a group called "all". and put the IP address of the machine in that group.

Check if Ansible can access the hosts using Ping

Let's verify that Ansible can access the machine. Just as with network you'd use the ping[14] command, Ansible also provides a command called "ping" that checks if the remote machine is accessible to Ansible. Instead of sending ICMP packets[15], the ping of Ansible will try to log in to the remote machine using standard SSH.

Run the following command:

```
1  $ ansible -i inventory.cfg all -u root -m ping
```

It will first ask you to check the authenticity of the host by displaying a message like this:

```
1  The authenticity of host '159.65.236.52 (159.65.236.52)' can't be established.
2  ECDSA key fingerprint is SHA256:5G1v0wAEaqgQVfXrrqYlp4kRFTLJc263H3CvcqUEnlg.
3  Are you sure you want to continue connecting (yes/no)?
```

If you type in yes then it will add the signature of the host to ~/.ssh/known_hosts and it won't bother you again with the same question.

The command will continue and print

```
1  159.65.236.52 | SUCCESS => {
2      "changed": false,
3      "failed": false,
4      "ping": "pong"
5  }
```

If you don't want to check the authenticity of the host you can tell ansible to tell the ssh command using the --ssh-common-args flag to not check the authenticity and to not save the signature in the known_hosts file.

---

[14]https://en.wikipedia.org/wiki/Ping_(networking_utility)
[15]https://en.wikipedia.org/wiki/Internet_Control_Message_Protocol

```
1  $ ansible -i inventory.cfg all -u root -m ping --ssh-common-args "-o UserKnownHostsF\
2  ile=/dev/null -o StrictHostKeyChecking=no"
```

This will have the same output as the earlier command.

```
1  159.65.236.52 | SUCCESS => {
2      "changed": false,
3      "failed": false,
4      "ping": "pong"
5  }
```

Let's see the details of the command:

- The `-t inventory.cfg` tells ansible the location of the inventory file. * `all` selects the host(s) upon which we'd like to act. * `-u root` tells Ansible to use user `root` on the remote server. * `-m ping` tells Ansible to execute the "ping" module. * `--ssh-common-args` tells ansible to pass the `-o UserKnownHostsFile=/dev/null -o StrictHostKeyChecking=no` flags to the ssh command it uses.

authenticity of the host

For the upcoming command I'll assume that when you ran the previous command you ran it without the special parameter for ssh and then you typed "yes" when the ssh client wanted to save the signature in the "~/.ssh/known_hosts" file. If not run this again:

```
1  $ ansible -i inventory.cfg all -u root -m ping
```

The next time you run the above command it should work without asking any further questions.

Collect information from the remote server

Ansible has plenty of modules, but it also allows you to execute arbitrary command on the remote machine:

Fetch the date of the remote machine

```
1  $ ansible -i inventory.cfg all -u root -a date
```

```
1  159.65.236.52 | SUCCESS | rc=0 >>
2  Wed Mar  7 11:35:52 UTC 2018
```

Get the hostname of the remote host:

```
1  ansible -i inventory.cfg all -u root -a hostname
```

```
1  159.65.236.52 | SUCCESS | rc=0 >>
2  centos-s-1vcpu-1gb-nyc1-01
```

uptime

```
1  $  ansible -i inventory.cfg all -u root -a uptime
```

```
1  159.65.236.52 | SUCCESS | rc=0 >>
2  11:40:38 up 41 min,  1 user,  load average: 0.05, 0.03, 0.05
```

free memory

```
1  $  ansible -i inventory.cfg all -u root -a free
```

```
1  159.65.236.52 | SUCCESS | rc=0 >>
2                total        used        free      shared  buff/cache   available
3  Mem:        1016224       83256      780424       13048      152544      767372
4  Swap:             0           0           0
```

free memory in megabytes

```
1  $  ansible -i inventory.cfg all -u root -a "free -m"
```

```
1  159.65.236.52 | SUCCESS | rc=0 >>
2                total        used        free      shared  buff/cache   available
3  Mem:            992          81         761          12         149         749
4  Swap:             0           0           0
```

Upgrade everything on the CentOS server

Usually when you get a new server some of the packages might be already out of date. Some might have had some security fixes. So updating them to the latest version i usually a good idea.

```
1  ansible -i inventory.cfg all -u root -m yum -a "name=* state=latest"
```

It will run a long time. Probably several minutes. Hopefully it will end with success with a big blob of output that starts with

```
1  159.65.236.52 | SUCCESS => {
2      "changed": true,
3      "failed": false,
```

IF you run the same command again, this time will say everything is up-to-date:

```
1  159.65.236.52 | SUCCESS => {
2      "changed": false,
3      "failed": false,
4      "msg": "",
5      "rc": 0,
6      "results": [
7          "Nothing to do here, all packages are up to date"
8      ]
9  }
```

Rebooting the CentOS server using Ansible

We can run the regular `shutdown` command with some flags:

```
1  $  ansible -i inventory.cfg all -u root -a "/sbin/shutdown -r now"
```

This command will reboot the server immediately, but you will see an error message. Basically because Ansible does not have time to properly disconnect before the server shuts down its ssh connection.

```
1  159.65.236.52 | UNREACHABLE! => {
2      "changed": false,
3      "msg": "Failed to connect to the host via ssh: Shared connection to 159.65.236.5\
4  2 closed.\r\n",
5      "unreachable": true
6  }
```

You can delay the shutdown by one minutes (it only works with increments of minutes)

```
1  $  ansible -i inventory.cfg all -u root -a "/sbin/shutdown -r +1"
```

That will return with success and a warning and a minute later the host will reboot itself.

```
1   [WARNING]: Module invocation had junk after the JSON data:    Broadcast message from\
2   root@centos-s-1vcpu-1gb-nyc1-01 (Wed 2018-03-07
3  13:46:31 UTC):     The system is going down for reboot at Wed 2018-03-07 13:47:31 UTC!
4
5  159.65.236.52 | SUCCESS | rc=0 >>
6  Shutdown scheduled for Wed 2018-03-07 13:47:31 UTC, use 'shutdown -c' to cancel.
```

To avoid that warnings we can even tell the shutdown command to avoid the broadcast:

```
1  $  ansible -i inventory.cfg all -u root -a "/sbin/shutdown --no-wall -r +1"
```

That looks like the cleanest so far:

```
1  159.65.236.52 | SUCCESS | rc=0 >>
2  Shutdown scheduled for Wed 2018-03-07 14:00:08 UTC, use 'shutdown -c' to cancel.
```

Conclusion

That's enough for now. We'll get deeper in an upcoming article.

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