

EPAM Systems, RD Dep., RD Dep.

MTN.*NIX.11 Automated environment
configuration management

Ansible. 1

REVISION HISTORY					
Ver.	Description of Change	Author	Date	Approved	
				Name	Effective Date
<1.0>	Initial revision	Siarhei Beliakou	16-Mar-2017		

Lab Work Task. Tomcat AS Provisioning

Review

Using Ansible v2.2.1 for provisioning tomcat application stack. Learning by doing.

Task

On Host Node (Control Machine):

1. Install Ansible v2.2.1 with python pip. Report details where ansible has been installed.

```
[student@epbyminw2473 day-1]$ which ansible
~/pyenv/shims/ansible
[student@epbyminw2473 day-1]$ ansible --version
ansible 2.2.1.0
  config file =
  configured module search path = Default w/o overrides
[student@epbyminw2473 day-1]$
```

2. Create folder ~/cm/ansible/day-1. All working files are supposed to be placed right there.

```
[student@epbyminw2473 day-1]$ pwd
/home/student/cm/ansible/day-1
[student@epbyminw2473 day-1]$ ls -la
total 44
drwxrwxr-x. 4 student student 4096 Mar 26 11:46 .
drwxrwxr-x. 8 student student 4096 Mar 24 14:17 ..
-rw-rw-r--. 1 student student 184 Mar 22 13:18 inventory
drwxrwxr-x. 2 student student 4096 Mar 21 20:57 soft
-rwxrwxr-x. 1 student student 736 Mar 21 21:02 test_vm.sh
-rw-rw-r--. 1 student student 584 Mar 21 17:16 tomcat_init.sh
-rw-rw-r--. 1 student student 5152 Mar 23 17:57 tomcat_provision.yml
-rw-rw-r--. 1 student student 569 Mar 21 18:24 tomcat.service.bak
drwxrwxr-x. 3 student student 4096 Mar 21 13:18 .vagrant
-rw-rw-r--. 1 student student 3031 Mar 21 13:18 Vagrantfile
[student@epbyminw2473 day-1]$
```

3. Spin up clear CentOS6 VM using vagrant ("vagrant init sbeliakou/centos-6.8-x86_64"). Verify connectivity to the host using ssh keys (user: vagrant)

```
[student@epbyminw2473 day-1]$ vagrant up
Bringing machine 'default' up with 'virtualbox' provider...
==> default: Importing base box 'sbeliakou/centos-6.8-x86_64'...
==> default: Matching MAC address for NAT networking...
==> default: Checking if box 'sbeliakou/centos-6.8-x86_64' is up to date...
==> default: Setting the name of the VM: day-1_default_1490518243321_2567
==> default: Clearing any previously set network interfaces...
==> default: Preparing network interfaces based on configuration...
    default: Adapter 1: nat
==> default: Forwarding ports...
    default: 22 (guest) => 2222 (host) (adapter 1)
==> default: Booting VM...
==> default: Waiting for machine to boot. This may take a few minutes...
    default: SSH address: 127.0.0.1:2222
    default: SSH username: vagrant
    default: SSH auth method: private key
```

```
[student@epbyminw2473 day-1]$ ssh -p 2222 vagrant@127.0.0.1
Last login: Thu Jan 26 20:47:31 2017 from 10.0.2.2
[vagrant@epplkraw0381t1 ~]$
```

```
[student@epbyminw2473 day-1]$ cat inventory
[tomcat]
tomcat_svr
[tomcat:vars]
ansible_host=localhost
ansible_port=2222
ansible_connection=ssh
ansible_user=vagrant
ansible_ssh_private_key_file=.vagrant/machines/default/virtualbox/private_key
[student@epbyminw2473 day-1]$
```

4. Create ansible inventory file (name: **inventory**) with remote host connection details:

- Remote VM hostname/ip/port
- Remote ssh log in username
- Connection type

```
[student@epbyminw2473 day-1]$ cat inventory
[tomcat]
tomcat_svr
[tomcat:vars]
ansible_host=localhost
ansible_port=2222
ansible_connection=ssh
ansible_user=vagrant
ansible_ssh_private_key_file=.vagrant/machines/default/virtualbox/private_key
[student@epbyminw2473 day-1]$
```

5. Test ansible connectivity to the VM with ad-hoc command:

\$ ansible VM-name -i inventory -m setup

Find out host details:

- Number of CPUs
- Host name
- Host IP(s)
- Total RAM

```
[student@epbyminw2473 day-1]$ ansible tomcat_svr -i inventory -m setup
tomcat_svr | SUCCESS => {
  "ansible_facts": {
    "ansible_all_ipv4_addresses": [
      "10.0.2.15"
    ],
    "ansible_all_ipv6_addresses": [
      "fe80::a00:27ff:fe6a:a863"
    ],
    "ansible_architecture": "x86_64",
    "ansible_bios_date": "12/01/2006",
    "ansible_bios_version": "VirtualBox",
    "ansible_cmdline": {
      "KEYBOARDTYPE": "pc",
      "KEYTABLE": "us",
```

```

[student@epbyminw2473 day-1]$ ansible tomcat_svr -i inventory -m setup | grep hostname
"ansible_hostname": "epplkraw0381t1",
[student@epbyminw2473 day-1]$ ansible tomcat_svr -i inventory -m setup | grep total
    "total": 616,
    "total": 1247,
"ansible_memtotal_mb": 616,
    "size_total": 18699583488,
    "size_total": 499355648,
"ansible_swaptotal_mb": 1247,
[student@epbyminw2473 day-1]$ ansible tomcat_svr -i inventory -m setup | grep processor
"ansible_processor": [
  "ansible_processor_cores": 2,
  "ansible_processor_count": 1,
  "ansible_processor_threads_per_core": 1,
  "ansible_processor_vcpus": 2,
[student@epbyminw2473 day-1]$ ansible tomcat_svr -i inventory -m setup | grep address
"ansible_all_ipv4_addresses": [
"ansible_all_ipv6_addresses": [
  "address": "10.0.2.15",
  "macaddress": "08:00:27:6a:a8:63",
  "sas_address": null,
  "address": "10.0.2.15",
  "address": "fe80::a00:27ff:fe6a:a863",
  "macaddress": "08:00:27:6a:a8:63",
  "address": "127.0.0.1",
  "address": "::1",
[student@epbyminw2473 day-1]$ █

```

6. Develop a playbook (name: **tomcat_provision.yml**) which is supposed to run against any host (specified in inventory)

Use following modules (at least):

- **copy**
- **file**
- **get_url**
- **group**
- **service**
- **shell**
- **unarchive**
- **user**
- **yum**

Define play variables (at least):

- **tomcat_version**
- **java_version**

Every task should have a name section with details of task purpose.

Examples:

- name: Ensure user student exists
- name: Fetch artifact form the Shared repository

tomcat_provision.yml ✕

```
1  - name: tomcat_provision
2    hosts: tomcat
3    vars:
4
5      download_folder: /tmp
6      apps_folder: /opt
7      vagrant_share: /vagrant/soft
8
9      java_version: '1.8.0_121'
10     tomcat_version: '8.5.12'
11
12     ### JDK
13     # jdk_rpm_name: 'jdk-8u121-linux-x64.rpm'
14     # jdk_download_url: 'http://download.oracle.com/otn-pub/java/jdk/8u121-b13/e9e7ea248e2c4826b92b3f075a80e441/jdk-8u121-linux-x64.rpm'
15     # jdk_version: 'jdk1.8.0_121'
16
17     # Tomcat
18     tomcat_archive: 'apache-tomcat-{{tomcat_version}}.tar.gz'
19     tomcat_directory: 'apache-tomcat-{{tomcat_version}}'
20     tomcat_download_url: 'http://archive.apache.org/dist/tomcat/tomcat-8/v{{tomcat_version}}/bin/{{tomcat_archive}}'
21     tomcat_user: tomcat_as
22     tomcat_group: tomcat_as_group
23
24     tasks:
25
26     ##### JAVA #####
27     ##### OpenJava from web
28     - name: install java
29       yum: name=java state=latest
30       become: yes
31
32     ##### OracleJDK from web
33     #- name: download {{jdk_version}}
34     # shell: 'curl -v -j -k -L -H "Cookie: oraclelicense=accept-securebackup-cookie" {{jdk_download_url}} -o {{download_folder}}/{{jdk_rpm_name}}'
35     #- name: install {{jdk_rpm_name}} rpm from a local file
36     # yum: name={{download_folder}}/{{jdk_rpm_name}} state=present
37     # become: yes
38
39     ##### OracleJDK from vagrant_share
40     # - name: install OracleJDK rpm from a local file
41     #   yum: name={{vagrant_share}}/{{jdk_rpm_name}} state=present
42     #   become: yes
43     ##### /JAVA #####
```

```

44 ▼ ##### TOMCAT #####
45
46 ##### Preparing env for Tomcat
47
48 # create tomcat user and group
49 ▼ - name: group "tomcat_as_group"
50     group: name={{tomcat_group}}
51     become: yes
52
53 ▼ - name: user "tomcat_as"
54     user: name={{tomcat_user}} group={{tomcat_group}} home={{apps_folder}}/tomcat
55     become: yes
56
57 # - name: tomcat dir
58 #   shell: mkdir -p {{apps_folder}}/tomcat #/{{tomcat_version}}
59 ▼ #   become: yes
60
61 ##### install Tomcat
62 ▼ - name: download tomcat
63     get_url: url={{tomcat_download_url}} dest={{download_folder}}
64     become: yes
65     become_user: '{{tomcat_user}}'
66
67 ▼ - name: install tomcat
68     unarchive: src={{download_folder}}/{{tomcat_archive}} dest={{apps_folder}}/tomcat remote_src=yes #/{{tomcat_version}} remote_src=yes
69     become: yes
70     become_user: '{{tomcat_user}}'
71 # ##### Tomcat from vagrant_share
72 # - name: install tomcat
73 #   unarchive: src={{vagrant_share}}/{{tomcat_archive}} dest={{apps_folder}}/tomcat remote_src=yes #/{{tomcat_version}} remote_src=yes
74 #   become: yes
75
76 ▼ - name: rename tomcat dir
77     command: mv {{apps_folder}}/tomcat/{{tomcat_directory}} {{apps_folder}}/tomcat/{{tomcat_version}} creates={{apps_folder}}/tomcat/{{tomcat_version}}
78     become: yes
79     become_user: '{{tomcat_user}}'
80
81 ▼ - name: copying existing init script
82     template: src=tomcat.service.j2 dest={{apps_folder}}/tomcat/{{tomcat_version}}/tomcat.service
83     become: yes
84     become_user: '{{tomcat_user}}'
85
86 ▼ - name: setting right permissions to service
87     shell: chmod a+x {{apps_folder}}/tomcat/{{tomcat_version}}/tomcat.service
88     become: yes
89
90 - name: create tomcat service
91     copy: src={{apps_folder}}/tomcat/{{tomcat_version}}/tomcat.service dest=/etc/rc.d/init.d/tomcat mode=a+x remote_src=yes
92     # shell: ln -s {{apps_folder}}/tomcat/{{tomcat_version}}/tomcat /etc/rc.d/init.d/tomcat
93     become: yes
94
95 ▼ - name: start tomcat service
96     service: name=tomcat state=started # enabled=yes
97     become: yes
98     become_user: '{{tomcat_user}}'
99

```

```
100 ##### check service is running
101 - name: check tomcat service status
102   shell: service tomcat status
103   become: yes
104
105 - name: check process is running
106   shell: ps aux | grep tomcat | grep -v grep
107
108 - name: curl
109   shell: "curl -sL -w %{http_code} http://127.0.0.1:8080 -o /dev/null"
110   become: yes
111
112 - name: Get started time
113   shell: |
114     echo Now: date
115     echo 'Was started:' pid=`ps aux | grep tomcat | grep -v 'worker process is shutting down' | head -1 | awk '{print $2}'`
116     stat -c %z /proc/$pid
117   become: yes
118 ##### /TOMCAT #####
119
```

Ensure tomcat is up and running properly with module "shell" (at least 3 different checks).

```
TASK [check tomcat service status] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:105
changed: [tomcat_svr] => {"changed": true, "cmd": "service tomcat status", "delta": "0:00:01.016926", "end": "2017-03-26 11:18:19.804748", "rc": 0, "start": "2017-03-26 11:18:18.787822", "stderr": "", "stdout": "Tomcat is running", "stdout_lines": ["Tomcat is running"], "warnings": ["Consider using service module rather than running service"]}
```

[WARNING]: Consider using service module rather than running service

```
TASK [check process is running] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:109
changed: [tomcat_svr] => {"changed": true, "cmd": "ps aux | grep tomcat | grep -v grep", "delta": "0:00:00.007565", "end": "2017-03-26 11:18:20.096844", "rc": 0, "start": "2017-03-26 11:18:20.089279", "stderr": "", "stdout": "501      7659 49.0 10.9 2546676 68960 ?        S1   11:18   0:01 /usr/bin/java -Djava.util.logging.config.file=/opt/tomcat/8.5.12/conf/logging.properties -Djava.util.logging.manager=org.apache.juli.ClassLoaderLogManager -Djdk.tls.ephemeralDHKeySize=2048 -Djava.protocol.handler.pkgs=org.apache.catalina.webresources -classpath /opt/tomcat/8.5.12/bin/bootstrap.jar:/opt/tomcat/8.5.12/bin/tomcat-juli.jar -Dcatalina.base=/opt/tomcat/8.5.12 -Dcatalina.home=/opt/tomcat/8.5.12 -Djava.io.tmpdir=/opt/tomcat/8.5.12/temp org.apache.catalina.startup.Bootstrap start", "stdout_lines": ["501      7659 49.0 10.9 2546676 68960 ?        S1   11:18   0:01 /usr/bin/java -Djava.util.logging.config.file=/opt/tomcat/8.5.12/conf/logging.properties -Djava.util.logging.manager=org.apache.juli.ClassLoaderLogManager -Djdk.tls.ephemeralDHKeySize=2048 -Djava.protocol.handler.pkgs=org.apache.catalina.webresources -classpath /opt/tomcat/8.5.12/bin/bootstrap.jar:/opt/tomcat/8.5.12/bin/tomcat-juli.jar -Dcatalina.base=/opt/tomcat/8.5.12 -Dcatalina.home=/opt/tomcat/8.5.12 -Djava.io.tmpdir=/opt/tomcat/8.5.12/temp org.apache.catalina.startup.Bootstrap start"], "warnings": []}
```

```

TASK [curl] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:112
changed: [tomcat_svr] => {"changed": true, "cmd": "curl -sL -w %{http_code} http://127.0.0.1:8080 -o /dev/null",
"delta": "0:00:23.345332", "end": "2017-03-26 11:18:43.697043", "rc": 0, "start": "2017-03-26 11:18:20.351711", "
stderr": "", "stdout": "200", "stdout_lines": ["200"], "warnings": ["Consider using get_url or uri module rather
than running curl"]}}
[WARNING]: Consider using get_url or uri module rather than running curl

TASK [Get started time] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:116
changed: [tomcat_svr] => {"changed": true, "cmd": "echo Now: date\n echo 'Was started:' pid=`ps aux | grep tomcat
| grep -v 'worker process is shutting down' | head -1 | awk '{print $2}'`\n stat -c %z /proc/$pid", "delta": "0:
00:00.024809", "end": "2017-03-26 11:18:43.992683", "rc": 0, "start": "2017-03-26 11:18:43.967874", "stderr": "",
"stdout": "Now: date\nWas started: pid=7659\n2017-03-26 11:16:33.009999182 +0100", "stdout_lines": ["Now: date",
"Was started: pid=7659", "2017-03-26 11:16:33.009999182 +0100"], "warnings": []}

PLAY RECAP *****
tomcat_svr                : ok=15   changed=14   unreachable=0   failed=0

```

Second (and other) run(s) of playbook shouldn't interrupt the service – one of checks should show tomcat uptime.

```
PLAY RECAP *****
tomcat_svr           : ok=15   changed=14   unreachable=0   failed=0

[student@epbyminw2473 day-1]$ ansible-playbook tomcat_provision.yml -i inventory -vv
No config file found; using defaults

PLAYBOOK: tomcat_provision.yml *****
1 plays in tomcat_provision.yml

PLAY [tomcat_provision] *****

TASK [setup] *****
ok: [tomcat_svr]

TASK [install java] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:28
ok: [tomcat_svr] => {"changed": false, "msg": "", "rc": 0, "results": ["All packages providing

TASK [group "tomcat_as_group"] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:53
ok: [tomcat_svr] => {"changed": false, "gid": 501, "name": "tomcat_as_group", "state": "presen

TASK [user "tomcat_as"] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:57
ok: [tomcat_svr] => {"append": false, "changed": false, "comment": "", "group": 501, "home": "
```

```

TASK [check process is running] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:109
changed: [tomcat_svr] => {"changed": true, "cmd": "ps aux | grep tomcat | grep -v grep", "del
7659 1.5 17.3 2586728 109344 ? S1 11:18 0:04 /usr/bin/java -Djava.util.loggiri
meraldDHKeySize=2048 -Djava.protocol.handler.pkgs=org.apache.catalina.webresources -classpath
t/8.5.12 -Djava.io.tmpdir=/opt/tomcat/8.5.12/temp org.apache.catalina.startup.Bootstrap start
tomcat/8.5.12/conf/logging.properties -Djava.util.logging.manager=org.apache.juli.ClassLoader
bin/bootstrap.jar:/opt/tomcat/8.5.12/bin/tomcat-juli.jar -Dcatalina.base=/opt/tomcat/8.5.12 -

TASK [curl] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:112
changed: [tomcat_svr] => {"changed": true, "cmd": "curl -sL -w %{http_code} http://127.0.0.1:
rr": "", "stdout": "200", "stdout_lines": ["200"], "warnings": ["Consider using get_url or us
[WARNING]: Consider using get_url or uri module rather than running curl

TASK [Get started time] *****
task path: /home/student/cm/ansible/day-1/tomcat_provision.yml:116
changed: [tomcat_svr] => {"changed": true, "cmd": "echo Now: date\n echo 'Was started:' pid='
0.009822", "end": "2017-03-26 11:23:13.817744", "rc": 0, "start": "2017-03-26 11:23:13.807922
arted: pid=7659", "2017-03-26 11:16:33.009999182 +0100", "warnings": []}

PLAY RECAP *****
tomcat_svr : ok=15 changed=6 unreachable=0 failed=0

[student@epbyminw2473 day-1]$ █

```

7. Software installation requirements:

- Tomcat AS should be installed from sources (tar.gz) – download from the official site (<http://archive.apache.org/dist/tomcat/>).
- Tomcat AS should be owned (and run) by user tomcat_as:tomcat_as_group
- Tomcat AS version should be 8.x
- Tomcat installation folder (CATALINA_HOME) is /opt/tomcat/**\$version**, where **\$version** is the version of tomcat defined in playbook
- Java can be installed from CentOS Repositories

8. Verification Procedure: playbook will be checked by instructor's CI system as follows:

- 8.1 Connect to student's host by ssh (username "student") with own ssh key.
- 8.2 Check the version of ansible installed on the system (as mentioned in point 1)
- 8.3 Go into the folder mentioned in point 2
- 8.4 Destroy/Launch VM: vagrant destroy && vagrant up
- 8.5 Execute VM provisioning: ansible-playbook tomcat_provision.yml -i inventory -vv
- 8.6 If previous steps are done successfully, instructor will check the report

9. Feedback: report issues/problems you had during the development of playbook and time spent for development.