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

```yaml
- name: tomcat_provision
  hosts: tomcat
  vars:

    download_folder: /tmp
    apps_folder: /opt
    vagrant_share: /vagrant/soft

    java_version: '1.8.0_121'
    tomcat_version: '8.5.12'

    ### JDK
    # jdk_rpm_name: 'jdk-8u121-linux-x64.rpm'
    # jdk_download_url: 'http://download.oracle.com/otn-pub/java/jdk/8u121-b13/e9e7ea248e2c4826b92b3f075a80e441/jdk-8u121-linux-x64.rpm'
    # jdk_version: 'jdk1.8.0_121'

    # Tomcat
    tomcat_archive: 'apache-tomcat-{{tomcat_version}}.tar.gz'
    tomcat_directory: 'apache-tomcat-{{tomcat_version}}'
    tomcat_download_url: 'http://archive.apache.org/dist/tomcat/tomcat-8/v{{tomcat_version}}/bin/{{tomcat_archive}}'
    tomcat_user: tomcat_as
    tomcat_group: tomcat_as_group

```

```
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
45
46
47
```

```
########################################################## TOMCAT ###################################################################

  ##### Preparing env for Tomcat

  # create tomcat user and group
  - name: group "tomcat_as_group"
    group: name={{tomcat_group}}
    become: yes

  - name: user "tomcat_as"
    user: name='{{tomcat_user}}' group={{tomcat_group}} home=/{{apps_folder}}/tomcat
    become: yes

  # - name: tomcat dir
  #   shell: mkdir -p {{apps_folder}}/tomcat #/{{tomcat_version}}
  #   become: yes

    ##### install Tomcat
  - name: download tomcat
    get_url: url={{tomcat_download_url}} dest={{download_folder}}
    become: yes
    become_user: '{{tomcat_user}}'

  - name: install tomcat
    unarchive: src={{download_folder}}/{{tomcat_archive}} dest={{apps_folder}}/tomcat remote_src=yes #/{{tomcat_version}} remote_src=yes
    become: yes
    become_user: '{{tomcat_user}}'
  #    ##### Tomcat from vagrant_share
  # - name: install tomcat
  #   unarchive: src={{vagrant_share}}/{{tomcat_archive}} dest={{apps_folder}}/tomcat remote_src=yes #/{{tomcat_version}} remote_src=yes
  #   become: yes

  - name: rename tomcat dir
    command: mv {{apps_folder}}/tomcat/{{tomcat_directory}} {{apps_folder}}/tomcat/{{tomcat_version}} creates={{apps_folder}}/tomcat/{{tomcat_version}}
    become: yes
    become_user: '{{tomcat_user}}'

  - name: copying existing init script
    template: src=tomcat.service.j2 dest={{apps_folder}}/tomcat/{{tomcat_version}}/tomcat.service
    become: yes
    become_user: '{{tomcat_user}}'
```

```
89
90    - name: setting right permissions to service
91      shell: chmod a+x {{apps_folder}}/tomcat/{{tomcat_version}}/tomcat.service
92      become: yes
93
94    - name: create tomcat service
95      copy: src={{apps_folder}}/tomcat/{{tomcat_version}}/tomcat.service dest=/etc/rc.d/init.d/tomcat mode=a+x remote_src=yes
96    #  shell: ln -s {{apps_folder}}/tomcat/{{tomcat_version}}/tomcat /etc/rc.d/init.d/tomcat
97      become: yes
98
99    - name: start tomcat service
100     service: name=tomcat state=started # enabled=yes
101     become: yes
102     become_user: '{{tomcat_user}}'
103
104   ##### check service is running
105   - name: check tomcat service status
106     shell: service tomcat status
107     become: yes
108
109   - name: check process is running
110     shell: ps aux | grep tomcat | grep -v grep
111
112   - name: curl
113     shell: "curl -sL -w %{http_code} http://127.0.0.1:8080 -o /dev/null"
114     become: yes
115
116   - name: Get started time
117     shell: |
118       echo Now: date
119       echo 'Was started:' pid=`ps aux | grep tomcat | grep -v 'worker process is shutting down' | head -1 | awk '{print $2}'`
120       stat -c %z /proc/$pid
121     become: yes
122 ############################################################ /TOMCAT ##################################################################
123
```

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": "201
7-03-26 11:18:19.804748", "rc": 0, "start": "2017-03-26 11:18:18.787822", "stderr": "", "stdout": "Tomcat is runn
ing", "stdout_lines": ["Tomcat is running"], "warnings": ["Consider using service module rather than running serv
ice"]}
 [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 ?       Sl   11:18   0:01 /usr/bin/java -Djava.util.logging.config.file=/o
pt/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.hom
e=/opt/tomcat/8.5.12 -Djava.io.tmpdir=/opt/tomcat/8.5.12/temp org.apache.catalina.startup.Bootstrap start", "stdo
ut_lines": ["501       7659 49.0 10.9 2546676 68960 ?       Sl   11:18   0:01 /usr/bin/java -Djava.util.logging.c
onfig.file=/opt/tomcat/8.5.12/conf/logging.properties -Djava.util.logging.manager=org.apache.juli.ClassLoaderLogM
anager -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 ?      Sl   11:18   0:04 /usr/bin/java -Djava.util.loggir
meralDHKeySize=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 ur
 [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.