

Lab Work Task. Day 3.

Making Roles and playbooks better.

Custom Filters, Custom Modules

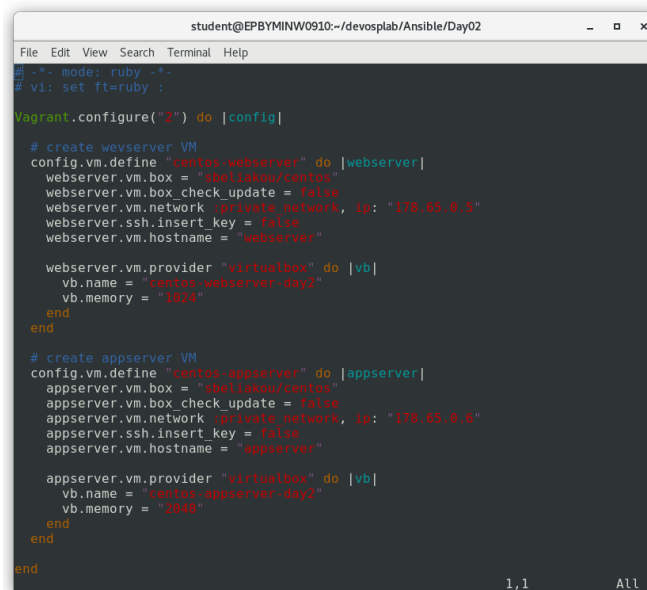
Task

A) On Control Machine:

Create folder ~/ansible/day3. All working files should be placed there (Vagrantfile, playbooks, roles folder with custom roles, library – for modules and filter_plugins for filters folders, inventory)

B) Spin up 2 VMs form single Vagrantfile. Compose Inventory:

- Specify groups
- Define group vars
- Define host vars
- Define ansible connection settings (common for all hosts/groups in inventory)



```
student@EPBYMINW0910:~/devoslab/Ansible/Day02
File Edit View Search Terminal Help
# -*- mode: ruby -*-
# vi: set ft=ruby :

Vagrant.configure("2") do |config|

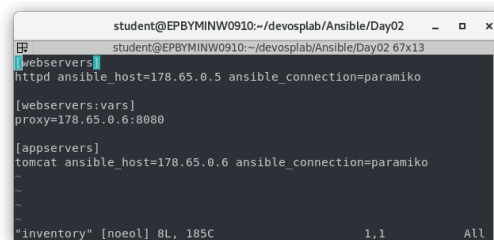
  # create wevserver VM
  config.vm.define "centos-webserver" do |webserver|
    webserver.vm.box = "bento/centos"
    webserver.vm.box_check_update = false
    webserver.vm.network :private_network, ip: "178.65.0.5"
    webserver.ssh.insert_key = false
    webserver.vm.hostname = "webserver"

    webserver.vm.provider "virtualbox" do |vb|
      vb.name = "centos-webserver-day2"
      vb.memory = "1024"
    end
  end

  # create appserver VM
  config.vm.define "centos-appserver" do |appserver|
    appserver.vm.box = "bento/centos"
    appserver.vm.box_check_update = false
    appserver.vm.network :private_network, ip: "178.65.0.6"
    appserver.ssh.insert_key = false
    appserver.vm.hostname = "appserver"

    appserver.vm.provider "virtualbox" do |vb|
      vb.name = "centos-appserver-day2"
      vb.memory = "2048"
    end
  end
end
```

Picture 1.1 – Vagrant file



```
student@EPBYMINW0910:~/devoslab/Ansible/Day02 67x13
[webservers]
httpd ansible_host=178.65.0.5 ansible_connection=paramiko

[webservers:vars]
proxy=178.65.0.6:8080

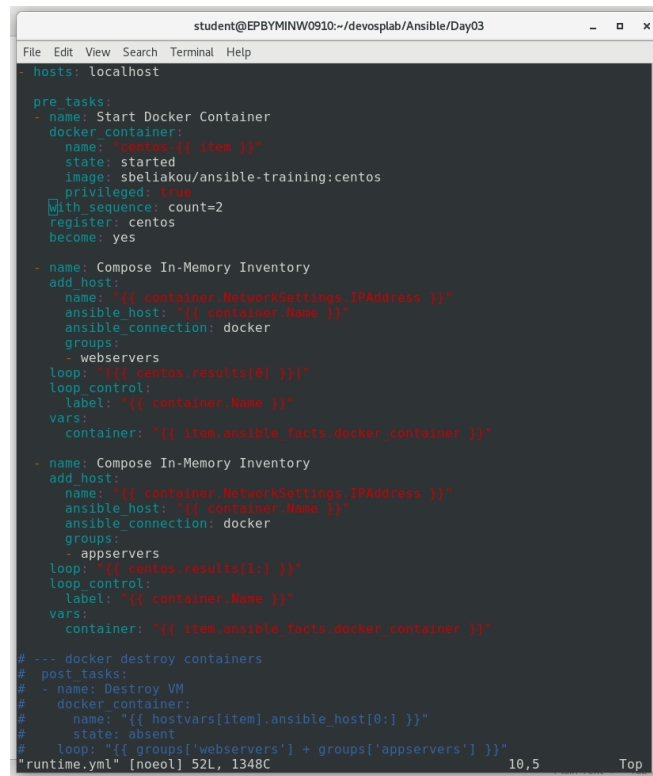
[appservers]
tomcat ansible_host=178.65.0.6 ansible_connection=paramiko

"inventory" [noeol] 8L, 185C 1,1 All
```

Picture 1.2 - Inventory

OR

Use example from repo to spin up environment with ansible and vagrantfile, register host in run-time inventory with all necessary parameters.



```
student@EPBYMINW0910:~/devoslab/Ansible/Day03
File Edit View Search Terminal Help
- hosts: localhost

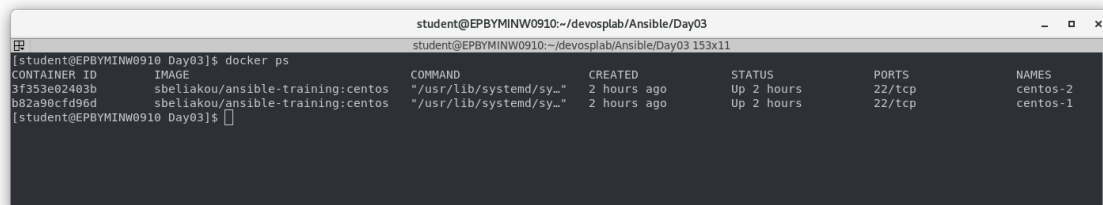
pre_tasks:
  - name: Start Docker Container
    docker_container:
      name: "centos-{{ item }}"
      state: started
      image: sbeliakou/ansible-training:centos
      privileged: true
      with_sequence: count=2
      register: centos
      become: yes

  - name: Compose In-Memory Inventory
    add_host:
      name: "{{ container.NetworkSettings.IPAddress }}"
      ansible_host: "{{ container.Name }}"
      ansible_connection: docker
      groups:
        - webservers
      loop: "{{ centos.results[0] }}"
      loop_control:
        label: "{{ container.Name }}"
      vars:
        container: "{{ item.ansible_facts.docker_container }}"

  - name: Compose In-Memory Inventory
    add_host:
      name: "{{ container.NetworkSettings.IPAddress }}"
      ansible_host: "{{ container.Name }}"
      ansible_connection: docker
      groups:
        - appservers
      loop: "{{ centos.results[1] }}"
      loop_control:
        label: "{{ container.Name }}"
      vars:
        container: "{{ item.ansible_facts.docker_container }}"

# --- docker destroy containers
# post_tasks:
#   - name: Destroy VM
#     docker_container:
#       name: "{{ hostvars[item].ansible_host[0] }}"
#       state: absent
#     loop: "{{ groups['webservers'] + groups['appservers'] }}"
"runtime.yml" [noeol] 52L, 1348C 10,5 Top
```

Picture 1.3 – Solution with docker



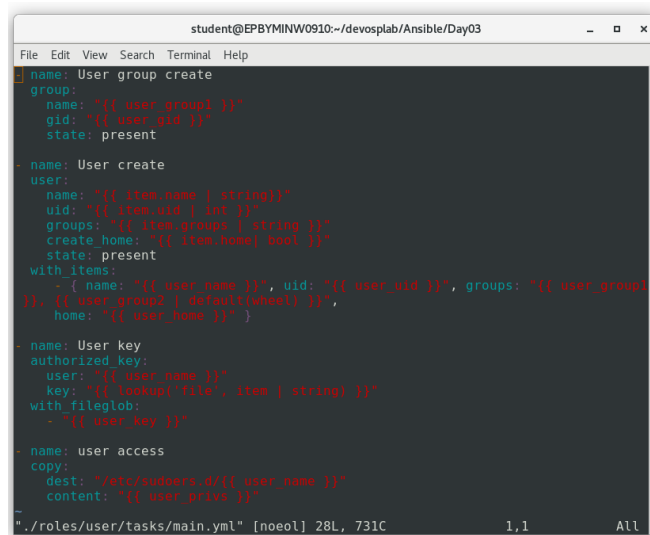
```
student@EPBYMINW0910:~/devoslab/Ansible/Day03 153x11
[student@EPBYMINW0910 Day03]$ docker ps
CONTAINER ID        IMAGE                                     COMMAND                  CREATED            STATUS             PORTS              NAMES
3f353e02403b       sbeliakou/ansible-training:centos      "/usr/lib/systemd/sy..." 2 hours ago       Up 2 hours        22/tcp            centos-2
b82a90cfd96d       sbeliakou/ansible-training:centos      "/usr/lib/systemd/sy..." 2 hours ago       Up 2 hours        22/tcp            centos-1
[student@EPBYMINW0910 Day03]$
```

Picture 1.4 – Docker containers

C) Develop role “user”, make sure it accepts following parameters:

- name (str) – user name to be created
- group (str) – user’s primary group
- groups (list) – user’s secondary groups
- uid (number) – user id
- gid (number) – group id
- home (str) – user’s home folder location, if not set – rely on system settings
- create_home (bool) – whether create home for user or no
- authorized_keys (list) - public ssh keys to be updated on the system / current user
- sudoers (str) – user’s sudoers privileges

Develop and test all possible cases (passing different parameters)



```
student@EPBYMINW0910:~/devoslab/Ansible/Day03
File Edit View Search Terminal Help
name: User group create
group:
  name: "{{ user_group1 }}"
  gid: "{{ user_gid }}"
  state: present

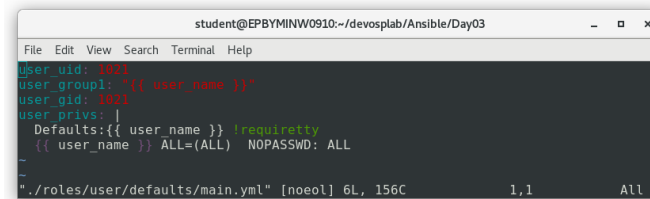
name: User create
user:
  name: "{{ item.name | string }}"
  uid: "{{ item.uid | int }}"
  groups: "{{ item.groups | string }}"
  create_home: "{{ item.home | bool }}"
  state: present
with_items:
  - { name: "{{ user_name }}", uid: "{{ user_uid }}", groups: "{{ user_group1 }}", {{ user_group2 | default(wheel) }} ,
    home: "{{ user_home }}" }

name: User key
authorized_key:
  user: "{{ user_name }}"
  key: "{{ lookup('file', item | string) }}"
with_fileglob:
  - "{{ user_key }}"

name: user access
copy:
  dest: "/etc/sudoers.d/{{ user_name }}"
  content: "{{ user_privs }}"

"/roles/user/tasks/main.yml" [noeol] 28L, 731C 1,1 All
```

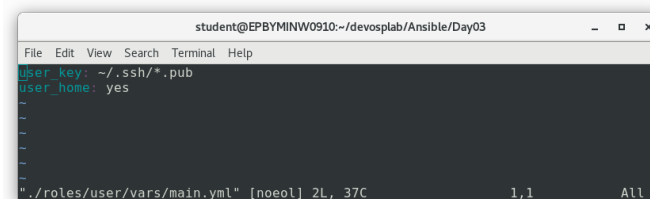
Picture 2.1 – User role `./roles/user/task/main.yml`



```
student@EPBYMINW0910:~/devoslab/Ansible/Day03
File Edit View Search Terminal Help
user_uid: 1021
user_group1: "{{ user_name }}"
user_gid: 1021
user_privs: |
  Defaults:{{ user_name }} !requiretty
  {{ user_name }} ALL=(ALL) NOPASSWD: ALL

"/roles/user/defaults/main.yml" [noeol] 6L, 156C 1,1 All
```

Picture 2.2 – User defaults `./roles/user/defaults/main.yml`



```
student@EPBYMINW0910:~/devoslab/Ansible/Day03
File Edit View Search Terminal Help
user_key: ~/.ssh/*.pub
user_home: yes

"/roles/user/vars/main.yml" [noeol] 2L, 37C 1,1 All
```

Picture 2.3 – User vars `./roles/user/vars/main.yml`

```

student@EPBYMINW0910:~/devoslab/Ansible/Day03
student@EPBYMINW0910:~/devoslab/Ansible/Day03 119x27

[{"exclusive": false, "follow": false, "item": "/home/student/.ssh/id_rsa.pub", "key": "ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQBAQjPFTWPTNKL1NAGJ952xIMs9B2d2W0Fh+c22/XBC5K8H8E0ppq5cT7/4Gnw3g0f+uqgBrz21g60A1s/W7DHA451NLL5MBRPM9F8D01zz18CJ30+QAW6d0cNKrWeyZQMP5MA0u5WBSUgyWE1eSHLCT7XUN0p4yCACPRH10f5Ca34BhvR0JAKtK9PL9ygsPM2U+pc500oteuBdyAQHKNLqccr7Eq55NvB02wfc2AXYXN5w+E7Y00G+bx5tdswk1vsoVcrxm/IWxflLxZkaPV0IY2scA0sdo179Cr+55+1e5xPcFCx51N00TmfZr29PHI/r7WjEDrG2Kj/rT student@EPBYMINW0910:~/devoslab/Ansible/Day03$ ssh devops@178.65.0.6
Last login: Wed Jul 17 09:42:42 2019 from 178.65.0.1
[devops@appserver ~]$ id
uid=1021(devops) gid=100(users) groups=100(users),1000(vagrant),1021(devops)
[devops@appserver ~]$ exit
logout
Connection to 178.65.0.6 closed.
[student@EPBYMINW0910 Day03]$
[student@EPBYMINW0910 Day03]$ ssh devops@178.65.0.5
Last login: Wed Jul 17 09:29:41 2019 from 178.65.0.1
[devops@webserver ~]$ id
uid=1021(devops) gid=100(users) groups=100(users),1000(vagrant),1021(devops)
[devops@webserver ~]$ exit
logout
Connection to 178.65.0.5 closed.
[student@EPBYMINW0910 Day03]$

TASK [user : user access] *****
ok: [httpd] => ({'changed': false, 'checksum': '7395efdc0fc948f9a51336600b4bc2d3b17c769', 'dest': '/etc/sudoers.d/devops', 'gid': 0, 'group': 'root', 'mode': '0644', 'owner': 'root', 'path': '/etc/sudoers.d/devops', 'size': 59, 'state': 'file', 'uid': 0})
ok: [tomcat] => ({'changed': false, 'checksum': '7395efdc0fc948f9a51336600b4bc2d3b17c769', 'dest': '/etc/sudoers.d/devops', 'gid': 0, 'group': 'root', 'mode': '0644', 'owner': 'root', 'path': '/etc/sudoers.d/devops', 'size': 59, 'state': 'file', 'uid': 0})

PLAY RECAP *****
httpd      : ok=5    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
tomcat     : ok=5    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[student@EPBYMINW0910 Day03]$

```

Picture 2.4 – Results playbook run

```

student@EPBYMINW0910:~/devoslab/Ansible/Day03
student@EPBYMINW0910:~/devoslab/Ansible/Day03 80x24

[student@EPBYMINW0910 Day03]$ ssh devops@178.65.0.6
Last login: Wed Jul 17 09:42:42 2019 from 178.65.0.1
[devops@appserver ~]$ id
uid=1021(devops) gid=100(users) groups=100(users),1000(vagrant),1021(devops)
[devops@appserver ~]$ exit
logout
Connection to 178.65.0.6 closed.
[student@EPBYMINW0910 Day03]$
[student@EPBYMINW0910 Day03]$ ssh devops@178.65.0.5
Last login: Wed Jul 17 09:29:41 2019 from 178.65.0.1
[devops@webserver ~]$ id
uid=1021(devops) gid=100(users) groups=100(users),1000(vagrant),1021(devops)
[devops@webserver ~]$ exit
logout
Connection to 178.65.0.5 closed.
[student@EPBYMINW0910 Day03]$

```

Picture 2.5 – Checks

D) (Re-)Develop role “java”

- Role accepts parameter version (java version to be installed)
- Role takes appropriate distribution package (on Control Machine) for installation or reports/fails with custom message like “java version distribution hasn’t been found”
- Role creates directory on the system: /opt/oracle/java/{{ version }}/ (JAVA_HOME)
- Role registers java/javac/jar in alternatives
- Role validates that installed java is the same as it should be by configuration

```

student@EPBYMINW0910:~/devoslab/Ansible/Day03
student@EPBYMINW0910:~/devoslab/Ansible/Day03 125x24

TASK [java install : Jar alternatives] *****
changed: [tomcat] => ({'changed': true, 'cmd': ['alternatives', '--install', '/usr/bin/jar', 'jar', '/opt/jdk-12.0.2/bin/jar', '2'], 'delta': '0:00:00.002555', 'end': '2019-07-17 13:21:47.321072', 'rc': 0, 'start': '2019-07-17 13:21:47.318517', 'stderr': '', 'stderr_lines': [], 'stdout': '', 'stdout_lines': []})

TASK [java install : Javac alternatives] *****
changed: [tomcat] => ({'changed': true, 'cmd': ['alternatives', '--install', '/usr/bin/javac', 'javac', '/opt/jdk-12.0.2/bin/javac', '2'], 'delta': '0:00:00.002518', 'end': '2019-07-17 13:21:47.944954', 'rc': 0, 'start': '2019-07-17 13:21:47.942436', 'stderr': '', 'stderr_lines': [], 'stdout': '', 'stdout_lines': []})

TASK [java install : Java version] *****
changed: [tomcat] => ({'changed': true, 'cmd': 'java --version', 'delta': '0:00:00.039433', 'end': '2019-07-17 13:21:49.002356', 'failed_when_result': false, 'rc': 0, 'start': '2019-07-17 13:21:48.962923', 'stderr': '', 'stderr_lines': [], 'stdout': 'java 12.0.2 2019-07-16\\nJava(TM) SE Runtime Environment (build 12.0.2+10)\\nJava HotSpot(TM) 64-Bit Server VM (build 12.0.2+10, mixed mode, sharing)', 'stdout_lines': ['java 12.0.2 2019-07-16', 'Java(TM) SE Runtime Environment (build 12.0.2+10)', 'Java HotSpot(TM) 64-Bit Server VM (build 12.0.2+10, mixed mode, sharing)']})

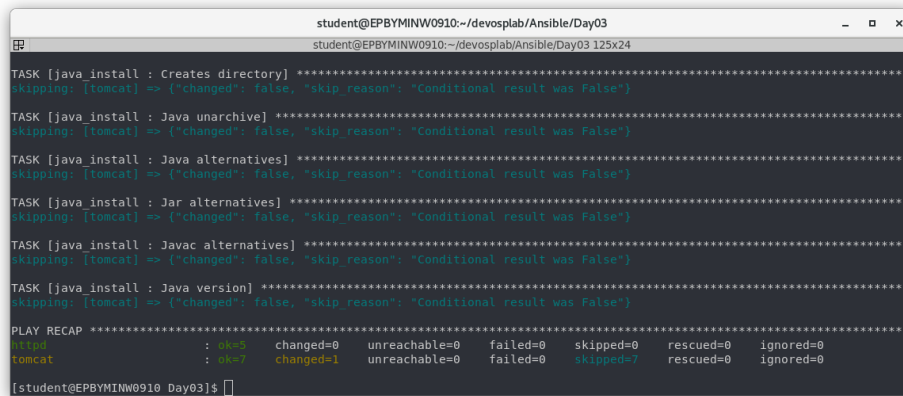
PLAY RECAP *****
httpd      : ok=5    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
tomcat     : ok=12   changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[student@EPBYMINW0910 Day03]$

```

Picture 3.1 – Validates java

- Role skips installation steps if there's a fact with suitable java configuration



```
student@EPBYMINW0910:~/devosplab/Ansible/Day03
student@EPBYMINW0910:~/devosplab/Ansible/Day03 125x24

TASK [java_install : Creates directory] *****
skipping: [tomcat] => ("changed": false, "skip_reason": "Conditional result was False")

TASK [java_install : Java unarchive] *****
skipping: [tomcat] => ("changed": false, "skip_reason": "Conditional result was False")

TASK [java_install : Java alternatives] *****
skipping: [tomcat] => ("changed": false, "skip_reason": "Conditional result was False")

TASK [java_install : Jar alternatives] *****
skipping: [tomcat] => ("changed": false, "skip_reason": "Conditional result was False")

TASK [java_install : Javac alternatives] *****
skipping: [tomcat] => ("changed": false, "skip_reason": "Conditional result was False")

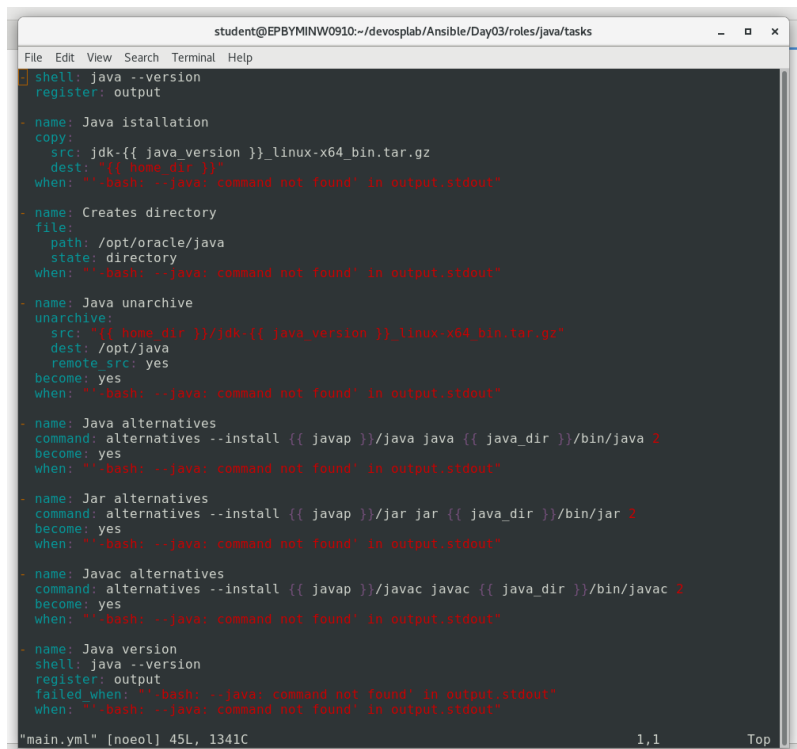
TASK [java_install : Java version] *****
skipping: [tomcat] => ("changed": false, "skip_reason": "Conditional result was False")

PLAY RECAP *****
total                : ok=5    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
tomcat               : ok=7    changed=1    unreachable=0    failed=0    skipped=7    rescued=0    ignored=0

[student@EPBYMINW0910 Day03]$
```

Picture 3.2 – Skip when java

Download several java distribution packages from Oracle site (*.tar.gz)



```
student@EPBYMINW0910:~/devosplab/Ansible/Day03/roles/java/tasks
File Edit View Search Terminal Help

1 shell: java --version
  register: output

- name: Java installation
  copy:
    src: jdk-{{ java_version }}_linux-x64_bin.tar.gz
    dest: "{{ home_dir }}"
  when: "'bash: --java: command not found' in output.stdout"

- name: Creates directory
  file:
    path: /opt/oracle/java
    state: directory
  when: "'bash: --java: command not found' in output.stdout"

- name: Java unarchive
  unarchive:
    src: "{{ home_dir }}/jdk-{{ java_version }}_linux-x64_bin.tar.gz"
    dest: /opt/java
    remote_src: yes
  become: yes
  when: "'bash: --java: command not found' in output.stdout"

- name: Java alternatives
  command: alternatives --install {{ javap }}/java java {{ java_dir }}/bin/java 2
  become: yes
  when: "'bash: --java: command not found' in output.stdout"

- name: Jar alternatives
  command: alternatives --install {{ javap }}/jar jar {{ java_dir }}/bin/jar 2
  become: yes
  when: "'bash: --java: command not found' in output.stdout"

- name: Javac alternatives
  command: alternatives --install {{ javap }}/javac javac {{ java_dir }}/bin/javac 2
  become: yes
  when: "'bash: --java: command not found' in output.stdout"

- name: Java version
  shell: java --version
  register: output
  failed_when: "'bash: --java: command not found' in output.stdout"
  when: "'bash: --java: command not found' in output.stdout"

"main.yml" [noeol] 45L, 1341C 1,1 Top
```

Picture 3.3 – /roles/java/tasks/main.yml



```
student@EPBYMINW0910:~/devosplab/Ansible/Day03/roles/java
File Edit View Search Terminal Help
home_dir: /home/{{ user_name }}
~
~
"/defaults/main.yml" [noeol] 1L, 31C 1,1 All
```

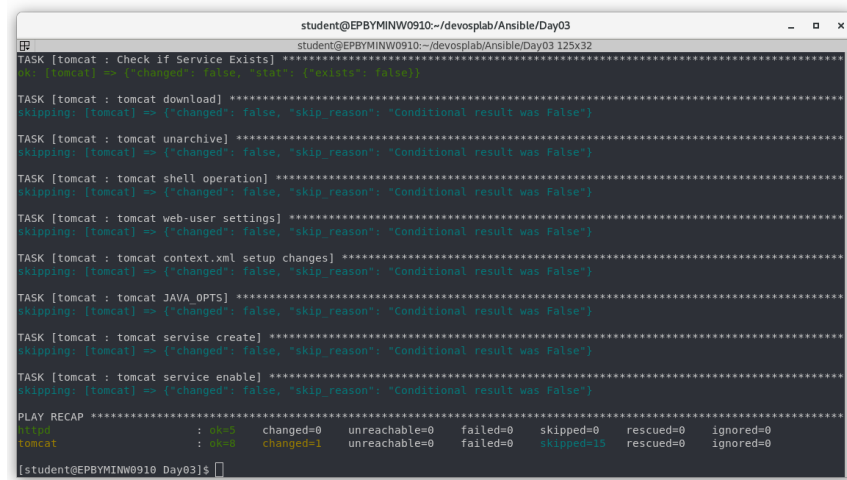
Picture 3.4 – /roles/java/defaults/main.yml



```
student@EPBYMINW0910:~/devosplab/Ansible/Day03/roles/java
File Edit View Search Terminal Help
java_dir: /opt/oracle/java/jdk-{{ java_version }}
javap: /usr/bin
~
"/vars/main.yml" [noeol] 2L, 65C 1,1 All
```

Picture 3.4 – /roles/java/vars/main.yml

E) Update Role “tomcat” from Homework 2 to skip installation/configuration if ansible fact reports that this configuration is already done



```
student@EPBYMINW0910:~/devosplab/Ansible/Day03
student@EPBYMINW0910:~/devosplab/Ansible/Day03 125x32
TASK [tomcat : Check if Service Exists] *****
ok: [tomcat] => {"changed": false, "stat": {"exists": false}}

TASK [tomcat : tomcat download] *****
skipping: [tomcat] => {"changed": false, "skip_reason": "Conditional result was False"}

TASK [tomcat : tomcat unarchive] *****
skipping: [tomcat] => {"changed": false, "skip_reason": "Conditional result was False"}

TASK [tomcat : tomcat shell operation] *****
skipping: [tomcat] => {"changed": false, "skip_reason": "Conditional result was False"}

TASK [tomcat : tomcat web-user settings] *****
skipping: [tomcat] => {"changed": false, "skip_reason": "Conditional result was False"}

TASK [tomcat : tomcat context.xml setup changes] *****
skipping: [tomcat] => {"changed": false, "skip_reason": "Conditional result was False"}

TASK [tomcat : tomcat JAVA_OPTS] *****
skipping: [tomcat] => {"changed": false, "skip_reason": "Conditional result was False"}

TASK [tomcat : tomcat service create] *****
skipping: [tomcat] => {"changed": false, "skip_reason": "Conditional result was False"}

TASK [tomcat : tomcat service enable] *****
skipping: [tomcat] => {"changed": false, "skip_reason": "Conditional result was False"}

PLAY RECAP *****
httpd      : ok=5  changed=0  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0
tomcat     : ok=0  changed=1  unreachable=0  failed=0  skipped=15  rescued=0  ignored=0

[student@EPBYMINW0910 Day03]$
```

Picture 4 – Skipped installation if tomcat service stated

F) Develop custom filter which simplifies use case from slide #33 (to find identirti_id number more simpler way)

```

student@EPBYMINW0910:~/devosplab/Ansible/Day03
student@EPBYMINW0910:~/devosplab/Ansible/Day03 108x32

TASK [Chek Filter] *****
ok: [tomcat] => {
  "identity_id": "81021312345"
}

PLAY [webservers] *****

TASK [Gathering Facts] *****
ok: [httpd]

TASK [httpd : httpd installation] *****
ok: [httpd]

TASK [httpd : httpd service enable] *****
ok: [httpd]

TASK [httpd : package_facts] *****
ok: [httpd]

TASK [httpd : create ansible facts folder httpd] *****
ok: [httpd]

TASK [httpd : httpd save deatails] *****
ok: [httpd]

PLAY RECAP *****
httpd      : ok=11  changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ign
ored=0
tomcat     : ok=9    changed=1    unreachable=0    failed=0    skipped=15   rescued=0    ign
ored=0

[student@EPBYMINW0910 Day03]$

```

Picture 5.1 – Result

```

student@EPBYMINW0910:~/devosplab/Ansible/Day03
student@EPBYMINW0910:~/devosplab/Ansible/Day03 85x32

# hosts: all
# roles:
#   - role: user
#     user_name: devops
#     user_groupz: vagrant

# Installing Tomcat and Java on Appserver host
hosts: appservers
vars:
  user_name: devops
  users ac:
    - { name: hleb, id: 81021312345 }
    - { name: devops, id: 81021312345 }

  identity_id: "{{ users.ac|join(',')|replace(' ','')|replace('-', '') }}"

tasks:
  - name: Chek Filter
    debug:
      var:
        identity_id

roles:
  - role: tomcat
    tomcat_version: tomcat-8
    tomcat_release: 8.5.42
    username_tomcat: tomcat
    usergroup tomcat: tomcat
    become: yes

# Installing HTTPD on Webserver host
"provision.yml" [noeol] 34L, 686C

1,1 Top

```

Picture 5.2 – Simpler way to use filter as variable

G) Create custom module on Bash or Python (up to you), which performs service's santy tests:

- Process is running as expected (by name, under user)
- Port is handled by proper process, in listening mode
- Web content of given url contains given regexp string
- Web server information (curl -IL url) contains given regexp strin

```

student@EPBYMINW0910:~/devosplab/Ansible/Day03
student@EPBYMINW0910:~/devosplab/Ansible/Day03 130x32

TASK [httpd : create ansible facts folder httpd] *****
ok: [httpd] => {changed: false, gid: 0, group: 'root', mode: '0755', owner: 'root', path: '/etc/ansible/facts.d', 'size': 24, 'state': 'directory', 'uid': 0}

TASK [httpd : httpd save deatails] *****
ok: [httpd] => {changed: false, checksum: '36ece824d50bb435b327a44ba885f2018c2f4385', dest: '/etc/ansible/facts.d/httpd.fact', 'gid': 0, 'group': 'root', 'mode': '0644', 'owner': 'root', 'path': '/etc/ansible/facts.d/httpd.fact', 'size': 22, 'state': 'file', 'uid': 0}

TASK [module bash] *****
ok: [httpd] => {changed: false, hostname: 'webserver', 'netstat': 'tcp        0          0 0.0.0.0:0.0.0.0 LISTEN          *                * 2927/httpd', 'process': '12582 5015 3079 3078 3077 3076 3075 2927'})

PLAY RECAP *****
httpd      : ok=12  changed=0  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0
tomcat     : ok=9   changed=1  unreachable=0  failed=0  skipped=15  rescued=0  ignored=0

[student@EPBYMINW0910 Day03]$

```

Picture 5.1 – Results

Use Loop Control to clean playbook output

```

student@EPBYMINW0910:~/devosplab/Ansible/Day03
student@EPBYMINW0910:~/devosplab/Ansible/Day03 130x32

TASK [httpd : create ansible facts folder httpd] *****
ok: [httpd] => {changed: false, gid: 0, group: 'root', mode: '0755', owner: 'root', path: '/etc/ansible/facts.d', 'size': 24, 'state': 'directory', 'uid': 0}

TASK [httpd : httpd save deatails] *****
ok: [httpd] => {changed: false, checksum: '36ece824d50bb435b327a44ba885f2018c2f4385', dest: '/etc/ansible/facts.d/httpd.fact', 'gid': 0, 'group': 'root', 'mode': '0644', 'owner': 'root', 'path': '/etc/ansible/facts.d/httpd.fact', 'size': 22, 'state': 'file', 'uid': 0}

TASK [module] *****
ok: [httpd] => {itemstarted: {
  'msg': 'started'

PLAY RECAP *****
httpd      : ok=12  changed=0  unreachable=0  failed=0  skipped=0  rescued=0  ignored=0
tomcat     : ok=9   changed=1  unreachable=0  failed=0  skipped=15  rescued=0  ignored=0

[student@EPBYMINW0910 Day03]$

```

Picture 5.2 – Results

```

tasks:
- name: module
  debug: msg={{item.module_bash}}
  with_items:
    - module bash: started
    # - module python:
  loop control:
    label: '%(item.module_bash)s'
"provision.yml" 43L, 874C                                     43,7      Bot

```

Picture 5.3 – Playbook