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AUTOMATION OF NETWORK/SERVER SECURITY PROVISIONING USING DEVOPS TOOLS.

TECHNICAL MANAUAL

STUDENT: KATIE BROPHY C00224531
SUPERVISOR: JAMES EGAN

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SYSTEM REQUIREMENTS

- ❖ 2 ubuntu virtual machines
- ❖ Devasc Virtual machine
- ❖ CSr100v virtual machine

INSTALLATION INSTRUCTIONS

On ubuntu control node

sudo apt-get update

sudo apt-get upgrade

sudo apt-get install software-properties-common
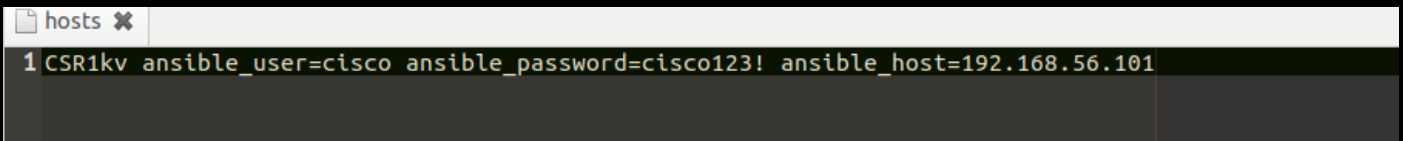
sudo apt-add repository ppa:ansible/ansible

sudo apt-get update

sudo apt-get install ansible

sudo apt-get install python

sudo apt-get install python3

sudo apt-get install openssh-server

sudo apt-get install sshpass

sudo apt-get update

sudo apt-get upgrade

ssh-keygen -t rsa

ssh-add

ssh-copy-id user@xxx.xxx.x.x

configure hostfile

```
hosts
1 CSR1kv ansible_user=cisco ansible_password=cisco123! ansible_host=192.168.56.101
```

SYSTEM USAGE, WITH SCREENSHOTS WHERE NEEDED.

BACKUP ROUTER

```
---
- name: AUTOMATIC BACKUP OF RUNNING-CONFIG
  hosts: CSR1kv
  gather_facts: false
  connection: local

  tasks:
   - name: DISPLAYING THE RUNNING-CONFIG
     ios_command:
       commands:
         - show running-config
     register: config

   - name: SAVE OUTPUT TO ./backups/
     copy:
       content: "{{ config.stdout[0] }}"
       dest: "backups/show_run_{{ inventory_hostname }}.txt"
```

```
devasc@labvm:~/labs/devnet-src/ansible/ansible-csr1000v$ ansible-playbook -v backup_cisco_router_playbook.yaml
Using /home/devasc/labs/devnet-src/ansible/ansible-csr1000v/ansible.cfg as config file

PLAY [AUTOMATIC BACKUP OF RUNNING-CONFIG] ***************************************************************

TASK [DISPLAYING THE RUNNING-CONFIG] *******************************************************************
ok: [CSR1kv] => {"ansible_facts": {"discovered_interpreter_python": "/usr/bin/python3"}, "changed": false, "stdout"
["Building configuration...\n\nCurrent configuration : 3924 bytes\n!\n! Last configuration change at 21:26:35 UTC F
 Apr 30 2021\n!\nversion 16.9\nservice timestamps debug datetime msec\nservice timestamps log datetime msec\nplatfo
 qfp utilization monitor load 80\nno platform punt-keepalive disable-kernel-core\nplatform console virtual\n!\nhost
me CSR1kv\n!\nboot-start-marker\nboot-end-marker\n!\n!\n!\nno aaa new-model\n!\n!\n!\n!\n!\n!\nip domain name exa
ple.netacad.com\n!\n!\n!\nlogin on-success log\n!\n!\n!\n!\n!\n!\n!\nsubscriber templating\n! \n! \n! \n! \n!\nmult
ink bundle-name authenticated\n!\n!\n!\n!\n!\ncrypto pki trustpoint TP-self-signed-3577023281\n enrollment selfsigne
\n subject-name cn=IOS-Self-Signed-Certificate-3577023281\n revocation-check none\n rsakeypair TP-self-signed-35770
281\n!\n!\ncrypto pki certificate chain TP-self-signed-3577023281\n certificate self-signed 01\n  30820330 30820218
0030201 02020101 300D0609 2A864886 F70D0101 05050030 \n  31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E656
2D 43657274 \n  69666963 6174652D 33353737 30323332 3831301E 170D3231 30343330 32313236 \n  34385A17 0D333030 31303
0 30303030 305A3031 312F302D 06035504 03132649 \n  4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D33 3
73730 \n  32333238 31308201 22300D06 092A8648 86F70D01 01010500 0382010F 00308201 \n  0A028201 0100CF32 D566D77A 9F4
7F77 8759F4B5 CB758131 5FA3528E D67D4FCD \n  57B98BA9 5ADCEDAF D24233C6 3112A897 59A560FD BF175DE0 DC41BE4A 5FC91B8
\n  8AB3E2F2 C2417EF1 7B7F81DF 14234ADC DA3E4833 9923E248 BE2DEBA2 3BD7183A \n  017AB2FE E033441E 3A6DFBE1 C80CAD24
D9445AC 3A4A1F12 195347F4 800D51EB \n  16F73834 4BC4FC04 4DC75B4C 9692E1FA 9CBCC9F2 59F08A22 CF5D806F AFA8ADC2 \n
```

```
on 0", " logging synchronous", " stopbits 1", "line vty 0 4", " login local", " transport input ssh", "line vty 5 1!
, " login local", " transport input ssh", "!", "!", "!", "!", "!", "!", "end"]]}

TASK [SAVE OUTPUT TO ./backups/] ***********************************************************************
changed: [CSR1kv] => {"changed": true, "checksum": "a1b2cd19ea0e004a2b6aef9fcc011882fd3219f7", "dest": "backups/show_
un_CSR1kv.txt", "gid": 900, "group": "devasc", "md5sum": "421576ce96819c97d43d2f542f932087", "mode": "0664", "owner"
 "devasc", "size": 3986, "src": "/home/devasc/.ansible/tmp/ansible-tmp-1619818154.589387-2400-203761642334385/source
, "state": "file", "uid": 900}

PLAY RECAP *********************************************************************************************
CSR1kv                     : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

devasc@labvm:~/labs/devnet-src/ansible/ansible-csr1000v$
```

CONFIG ROUTER

```yaml
---
- name: CONFIGURE IPv6 ADDRESSING

  hosts: CSR1kv

  gather_facts: false

  connection: local


  tasks:
  - name: SET IPv6 ADDRESS

    ios_config:

      parents: "interface GigabitEthernet1"

      lines:

        - description IPv6 ADDRESS

        - ipv6 address 2001:db8:acad:1::1/64

        - ipv6 address fe80::1:1 link-local


  - name: SHOW IPv6 INTERFACE BRIEF

    ios_command:

      commands:
```

```
        - show ipv6 interface brief
      register: output


  - name: SAVE OUTPUT ./ios_configurations/
    copy:
      content: "{{ output.stdout[0] }}"
      dest: "ios_configurations/IPv6_output_{{ inventory_hostname }}.txt"
```

BUILDING THE WEBSERVER

```
---
- hosts: webservers
  become: yes
  become_user: root
  gather_facts: false
  tasks:


  - name: INSTALL PYTHON
    apt: name=python3 state=present


  - name: INSTALL pip
    apt: name=python3-pip state=present


  - name: INSTALL APACHE2
    package: name=apache2 state=present


  - name: INSTALL APACHE2-PHP5
    package: name=libapache2-mod-php state=present


  - name: COPY WEB PAGES
    copy: src=webpages/ dest=/var/www/html


  - name: INSTALL PHP-MYSQL
    package: name=php-mysql state=present


  - name: INSTALL MYSQL SERVER
```

```yaml
    package: name=mysql-server state=present

  - name: INSTALL SOFTWARE
    package: name=software-properties-common state=present

  - name: INSTALL Python MYSQLB
    pip: name=PyMySQL

  - name: INSTALL MYSQLCLIENT
    apt: name=libmysqlclient-dev state=present

  - name: START MYSQL
    shell: "service mysql start"

  - name: ENABLE MYSQL ON STARTUP
    service: name=mysql state=started enabled=true

  - name: CREATE DB
    mysql_db:
      login_host: 192.168.1.10
      login_user: root
      login_password: user123
      login_unix_socket: /var/run/mysqld/mysqld.sock
      name: fyp1
      state: present

  - name: CREATE DB USER
    mysql_user:
      login_host: 192.168.1.10
      login_user: root
      login_password: user123
      login_unix_socket: /var/run/mysqld/mysqld.sock
      user: root
      password: user123
      priv: "*.*:ALL,GRANT"
```

```yaml
      state: present


  - name: CREATE TABLE
    copy: src=db.sql dest=db.sql


  - name:  FILL TABLE
    mysql_db:
      login_host: 192.168.1.10
      login_user: root
      login_password: user123
      login_unix_socket: /var/run/mysqld/mysqld.sock
      name: fyp1
      state: import
      target: db.sql
```

```
control@control-VirtualBox:~$ cd Ansible
control@control-VirtualBox:~/Ansible$ ansible-playbook -v servers.yaml
Using /home/control/Ansible/ansible.cfg as config file

PLAY [webservers] ****************************************************
*

TASK [INSTALL PYTHON] ***********************************************
*
ok: [192.168.1.10] => {"ansible_facts": {"discovered_interpreter_python": "/usr
/bin/python3"}, "cache_update_time": 1619650444, "cache_updated": false, "chang
ed": false}

TASK [INSTALL pip] **************************************************
*
ok: [192.168.1.10] => {"cache_update_time": 1619650444, "cache_updated": false,
 "changed": false}

TASK [INSTALL APACHE2] *********************************************
*
ok: [192.168.1.10] => {"cache_update_time": 1619650444, "cache_updated": false,
 "changed": false}

TASK [INSTALL APACHE2-PHP5] ****************************************
*
ok: [192.168.1.10] => {"cache_update_time": 1619650444, "cache_updated": false,
 "changed": false}

TASK [COPY WEB PAGES] **********************************************
```

```
TASK [COPY WEB PAGES] **************************************************
*
changed: [192.168.1.10] => {"changed": true, "dest": "/var/www/html/", "src": "
/home/control/Ansible/webpages/"}

TASK [INSTALL PHP-MYSQL] **********************************************
*
ok: [192.168.1.10] => {"cache_update_time": 1619650444, "cache_updated": false,
 "changed": false}

TASK [INSTALL MYSQL SERVER] *******************************************
*
ok: [192.168.1.10] => {"cache_update_time": 1619650444, "cache_updated": false,
 "changed": false}

TASK [INSTALL SOFTWARE] ***********************************************
*
ok: [192.168.1.10] => {"cache_update_time": 1619650444, "cache_updated": false,
 "changed": false}

TASK [INSTALL Python MYSQLB] ******************************************
*
ok: [192.168.1.10] => {"changed": false, "cmd": ["/usr/bin/pip3", "install", "P
yMySQL"], "name": ["PyMySQL"], "requirements": null, "state": "present", "stder
r": "", "stderr_lines": [], "stdout": "Requirement already satisfied: PyMySQL i
n /usr/local/lib/python3.8/dist-packages (1.0.2)\n", "stdout_lines": ["Requirem
ent already satisfied: PyMySQL in /usr/local/lib/python3.8/dist-packages (1.0.2
)"], "version": null, "virtualenv": null}
```

```
*
[WARNING]: Consider using the service module rather than running 'service'.  If
you need to use command because service is insufficient you can add 'warn:
false' to this command task or set 'command_warnings=False' in ansible.cfg to
get rid of this message.
changed: [192.168.1.10] => {"changed": true, "cmd": "service mysql start", "del
ta": "0:00:00.817108", "end": "2021-04-30 23:11:36.209327", "rc": 0, "start": "
2021-04-30 23:11:35.392219", "stderr": "", "stderr_lines": [], "stdout": "", "s
tdout_lines": []}

TASK [ENABLE MYSQL ON STARTUP] ********************************************
*
ok: [192.168.1.10] => {"changed": false, "enabled": true, "name": "mysql", "sta
te": "started", "status": {"ActiveEnterTimestamp": "Fri 2021-04-30 23:08:40 IST
", "ActiveEnterTimestampMonotonic": "24696575", "ActiveExitTimestampMonotonic":
 "0", "ActiveState": "active", "After": "sysinit.target network.target basic.ta
rget -.mount system.slice systemd-journald.socket", "AllowIsolate": "no", "Allo
wedCPUs": "", "AllowedMemoryNodes": "", "AmbientCapabilities": "", "AssertResul
t": "yes", "AssertTimestamp": "Fri 2021-04-30 23:08:28 IST", "AssertTimestampMo
notonic": "12537834", "Before": "shutdown.target multi-user.target", "BlockIOAc
counting": "no", "BlockIOWeight": "[not set]", "CPUAccounting": "no", "CPUAffin
ity": "", "CPUAffinityFromNUMA": "no", "CPUQuotaPerSecUSec": "infinity", "CPUQu
otaPeriodUSec": "infinity", "CPUSchedulingPolicy": "0", "CPUSchedulingPriority"
: "0", "CPUSchedulingResetOnFork": "no", "CPUShares": "[not set]", "CPUUsageNSe
c": "[not set]", "CPUWeight": "[not set]", "CacheDirectoryMode": "0755", "CanCl
ean": "runtime", "CanIsolate": "no", "CanReload": "no", "CanStart": "yes", "Can
Stop": "yes", "CapabilityBoundingSet": "cap_chown cap_dac_override cap_dac_read
_search cap_fowner cap_fsetid cap_kill cap_setgid cap_setuid cap_setpcap cap_li
nux_immutable cap_net_bind_service cap_net_broadcast cap_net_admin cap_net_raw
```

```
TASK [CREATE DB] *********************************************************
*
ok: [192.168.1.10] => {"changed": false, "db": "fyp1", "db_list": ["fyp1"]}

TASK [CREATE DB USER] ****************************************************
*
[WARNING]: Module did not set no_log for update_password
changed: [192.168.1.10] => {"changed": true, "msg": "Privileges updated", "user
": "root"}

TASK [CREATE TABLE] *****************************************************
*
ok: [192.168.1.10] => {"changed": false, "checksum": "47ab4db3b99b8d2f8f2cd63bd
9f71984bdfc6321", "dest": "db.sql", "gid": 0, "group": "root", "mode": "0644",
"owner": "root", "path": "db.sql", "size": 356, "state": "file", "uid": 0}

TASK [FILL TABLE] ******************************************************
*
changed: [192.168.1.10] => {"changed": true, "db": "fyp1", "db_list": ["fyp1"],
 "msg": ""}

PLAY RECAP ************************************************************
*
192.168.1.10               : ok=16    changed=4    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0
```

BACKUP WEBSERVER

```yaml
---

- hosts: webservers
  become: yes
  become_user: root
  gather_facts: false
  tasks:


   - name: CREATE BACKUPS
     mysql_db:
       name: fyp1
       state: dump
       target: fyp1.sql
       login_host: 192.168.1.10
       login_unix_socket: /var/run/mysqld/mysqld.sock
       login_user: root
       login_password: user123


   - name: CREATE BACKUPS
     mysql_db:
       name: C00224531
       state: dump
       target: C00224531.sql
       login_host: 192.168.1.10
       login_unix_socket: /var/run/mysqld/mysqld.sock
       login_user: root
       login_password: user123
```

REBUILD WEBSERVER

```yaml
---

- hosts: webservers
  become: yes
  become_user: root
  gather_facts: false
  tasks:
```

```
- name: IMPORT DB
  mysql_db:
    name: fyp1
    state: import
    target: fyp1.sql
    login_host: 192.168.1.10
    login_unix_socket: /var/run/mysqld/mysqld.sock
    login_user: root
    login_password: user123
- name: IMPORT DB
  mysql_db:
    name: C00224531
    state: import
    target: C00224531.sql
    login_host: 192.168.1.10
    login_unix_socket: /var/run/mysqld/mysqld.sock
    login_user: root
    login_password: user123
```

BIBLIOGRAPHY

[DevOps,2020]	En.wikipedia.org. 2020. *Devops*. [online] Available at: <https://en.wikipedia.org/wiki/DevOps#cite_note-loukides-2012-2> [Accessed 13 November 2020].
[Chef Tutorial: Components and Configuration Management, and More Explained, 2020]	Simplilearn.com. 2020. *Chef Tutorial: Components And Configuration Management, And More Explained*. [online] Available at: <https://www.simplilearn.com/chef-tutorial-article> [Accessed 12 November 2020].
[Puri, 2020]	Puri, M., 2020. *A Complete Beginner'S Guide To Chef And Infrastructure As Code*. [online] freeCodeCamp.org. Available at: <https://www.freecodecamp.org/news/an-introduction-to-chef-and-infrastructure-as-code-7d8ad2689b8/> [Accessed 12 November 2020].
[What is Chef	Automate Infrastructure Configuration, 2020]	Apachebooster Blog: *What Is Chef	Automate Infrastructure Configuration*. [online] Available at: <https://apachebooster.com/blog/automate-infrastructure-

	configuration/> [Accessed 12 November 2020]. Showcasing the tech blogs written by our writers. 2020.
[What is a Puppet in DevOps? | Why Puppet Software for DevOps?, 2020]	Staragile.com. 2020. *What Is A Puppet In Devops? | Why Puppet Software For Devops?*. [online] Available at: <https://staragile.com/blog/puppet-in-devops> [Accessed 12 November 2020].
[Sheet and Sheet, 2020]	Sheet, P. and Sheet, P., 2020. *Puppet Cheat Sheet - Download In PDF & JPG Format - Intellipaat*. [online] Intellipaat Blog. Available at: <https://intellipaat.com/blog/tutorial/devops-tutorial/puppet-cheat-sheet/> [Accessed 12 November 2020].
[Anon, 2020]	Puppet.com. 2020. [online] Available at: <https://puppet.com/docs/continuous-delivery/3.x/cd_architecture.html> [Accessed 12 November 2020].
[Ansible, 2020]	Ansible, R., 2020. *Ansible For Provisioning*. [online] Ansible.com. Available at: <https://www.ansible.com/use-cases/provisioning> [Accessed 12 November 2020].
[Kolappan, 2020]	Kolappan, K., 2020. *Automating Infrastructure Deployments [IAAS] In AWS Cloud With Ansible*. [online] Oneglobesystems.com. Available at: <https://www.oneglobesystems.com/blog/automating-infrastructure-deployments-iaas-in-aws-cloud-with-ansible> [Accessed 12 November 2020].
Ansible, 2020	Ansible, R., 2020. *Red Hat Ansible Network Automation - Red Hat Ansible*. [online] Ansible.com. Available at: <https://www.ansible.com/use-cases/network-automation> [Accessed 12 November 2020].
[Network Automation with Ansible, 2020]	Slideshare.net. 2020. *Network Automation With Ansible*. [online] Available at: <https://www.slideshare.net/atarsha/network-automation-with-ansible-banog-meetup> [Accessed 12 November 2020].
[Ansible, 2020]	Ansible, R., 2020. *Ansible For Configuration Management*. [online] Ansible.com. Available at: <https://www.ansible.com/use-cases/configuration-management> [Accessed 12 November 2020].
Ansible, 2020]	Ansible, R., 2020. *Red Hat Ansible | Security Automation*. [online] Ansible.com. Available at: <https://www.ansible.com/use-cases/security-automation> [Accessed 12 November 2020].
[Johari, 2020]	Johari, A., 2020. *Chef Vs Puppet Vs Ansible Vs Saltstack: Which One To Choose | Edureka*. [online] Edureka. Available at: <https://www.edureka.co/blog/chef-vs-puppet-vs-ansible-vs-saltstack/> [Accessed 12 November 2020].
["Security in Django | Django Documentation | Django"]	Security in Django | Django Documentation | Django." Docs.Djangoproject.com, docs.djangoproject.com/en/3.1/topics/security/. Accessed 12 Nov. 2020.
["Flask vs Django in 2020: Which Framework to Choose?"]	"Flask vs Django in 2020: Which Framework to Choose?" Hackr.Io, hackr.io/blog/flask-vs-django. Accessed 13 Nov. 2020.