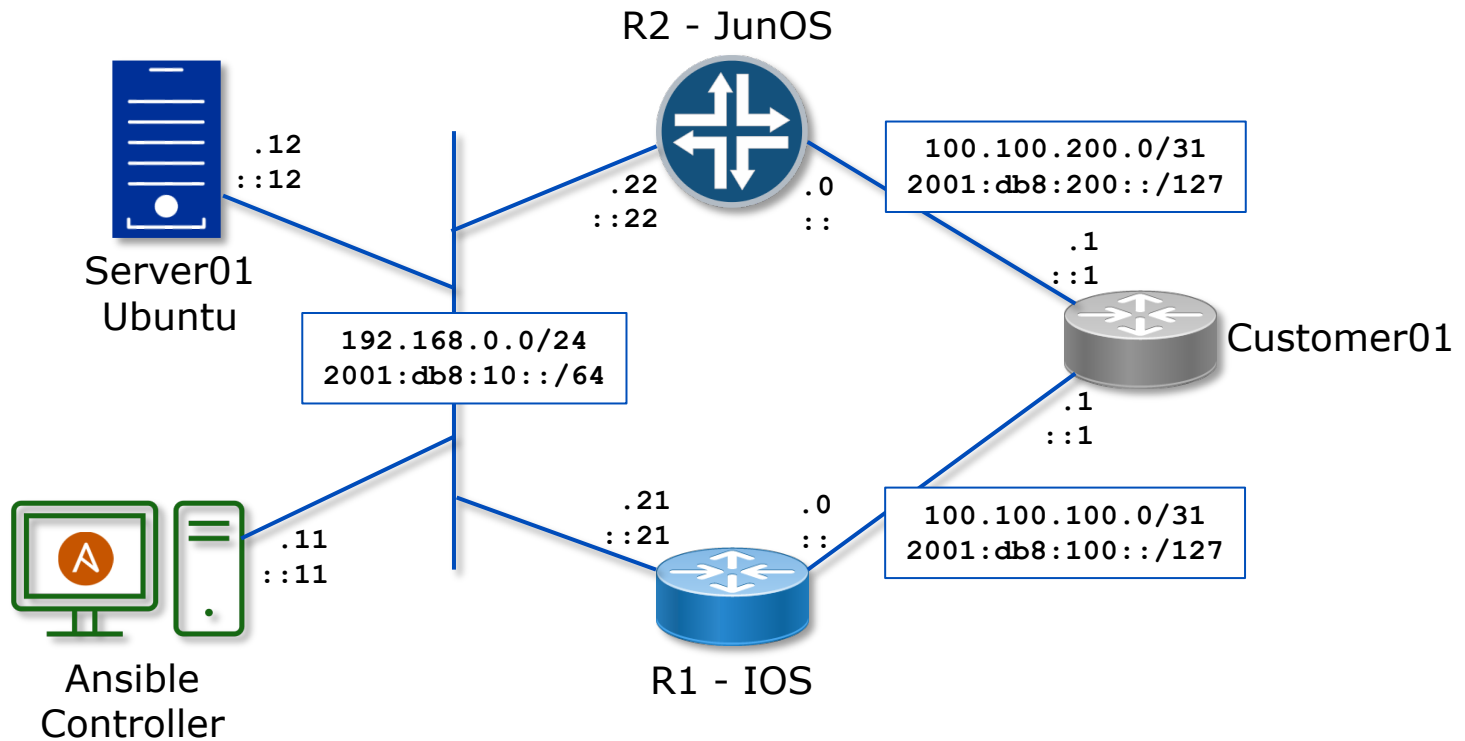


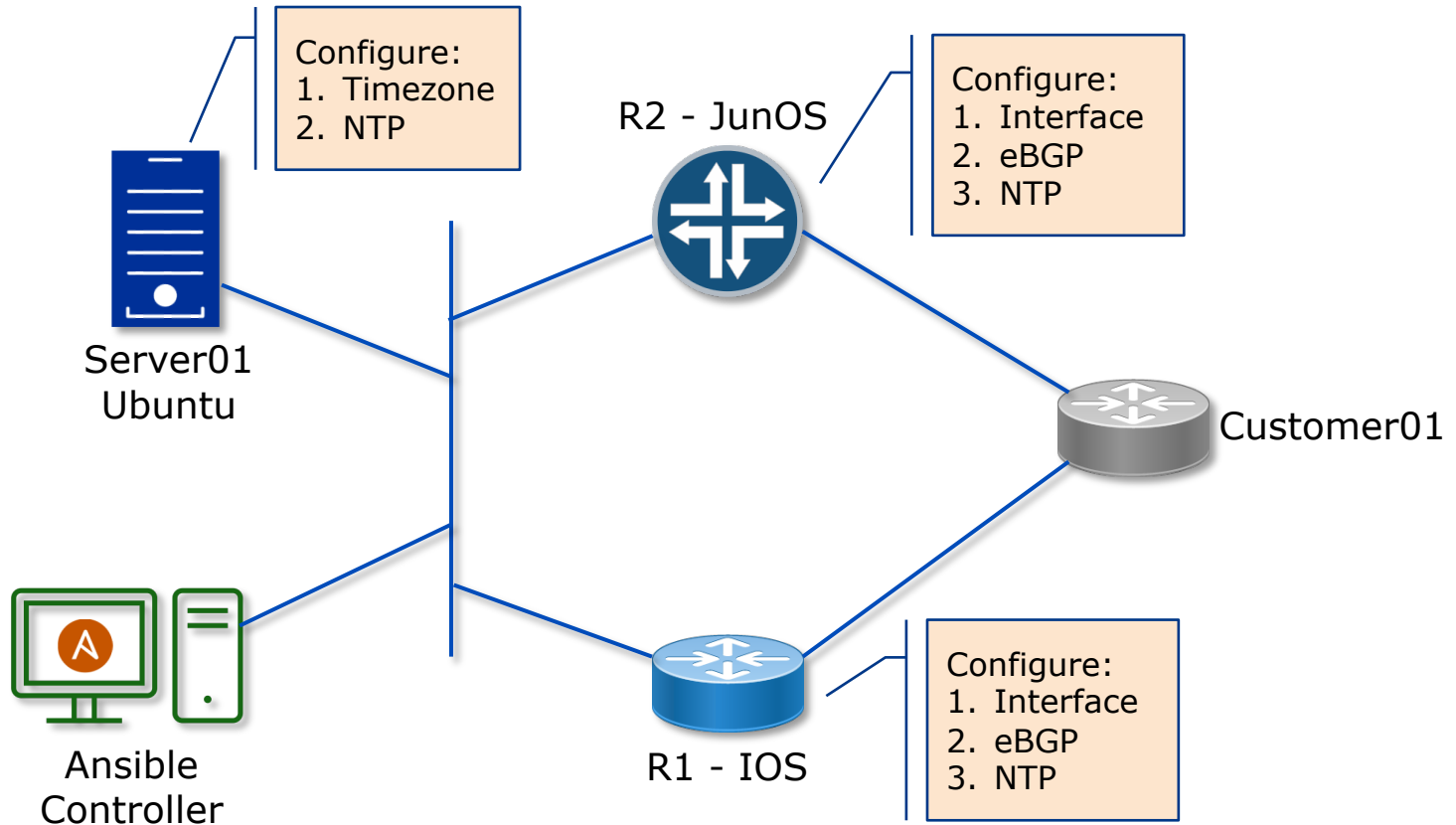
# Ansible Demo

APRICOT2022 / APNIC 53

# Lab Topology



# Goals



# Pre-configuration

- Ansible Controller
  - Install ansible and ansible-galaxy
  - Install JunOS collections/libraries
    - `junipernetworks.junos`
    - `libxml2-dev, libxslt1-dev, ncclient`
- R1 – IOS
  - Create SSH user
- R2 - JunOS
  - Enable NETCONF
  - Create SSH user
- NTP Server
  - Update packages

# We're going to use

- Inventory and Hosts
- Variables
- Templates
  - IP Address Filter
- Tasks
- Modules
- And of course, Playbook 😊

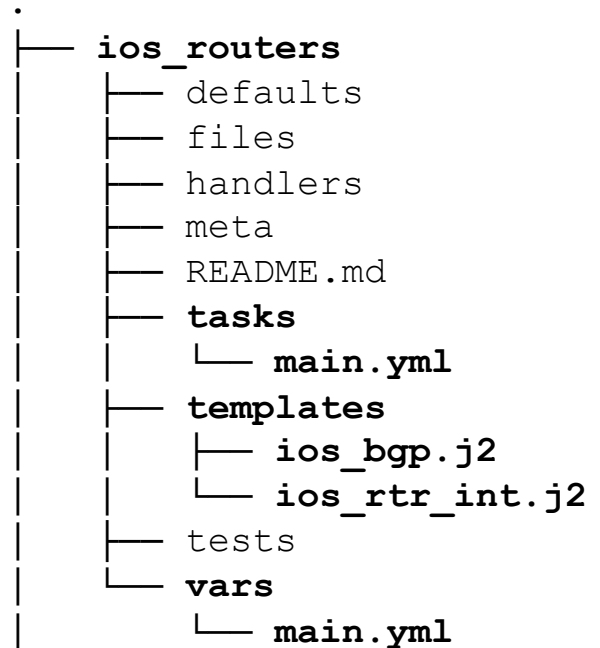
# Ansible - Roles

- Auto-generate the structure

```
$ ansible-galaxy init <role-name>
```

- Separate roles for:
  - Server
  - IOS
  - JunOS

```
/opt/apricot2022/roles$ ls  
ios_routers  junos_routers  servers
```



# Hosts and Variables

- `inventory/hosts`

```
[ios_router]
r1 ansible_host=192.168.0.21

[ios_router:vars]
ansible_ssh_user=eve
ansible_ssh_pass=eve
ansible_become=yes
ansible_become_method=enable
ansible_become_password=eve

[junos_router]
r2 ansible_host=192.168.0.22

[junos_router:vars]
ansible_connection=ansible.netcommon.netconf
ansible_network_os=junipernetworks.junos.junos
ansible_user=eve
ansible_password=Apric0t

[ubuntu_server]
server01 ansible_host=192.168.0.12

[ubuntu_server:vars]
ansible_user=eve
ansible_ssh_pass=Apric0t
ansible_become=yes
ansible_become_method=sudo
ansible_become_password=Apric0t
```

# Roles for R1 - Vars

- `ios_routers/vars/main.yml`

```
ios_vars:
  interface: "Ethernet1/1"
  description: "TO-Customer01"
  ipv4_addr: "100.100.100.0/31"
  ipv6_addr: "2001:db8:100::/127"
  as: "65500"
  peer_as: "63932"
  peer_desc_v4: "IPv4 BGP with Customer01"
  peer_desc_v6: "IPv6 BGP with Customer01"
  peer_auth: "apricot2022"
  ntp_v4: "192.168.0.12"
  ntp_v6: "2001:db8:10::12"
```



# Roles for R1 - Templates

- `ios_routers/templates/ios_rtr_int.j2`

```
interface {{ item.interface }}
  no shutdown
  description {{ item.description }}
  ip address {{ item.ipv4_addr | ipaddr('0') | ipaddr('address') }} \
  {{ item.ipv4_addr | ipv4('netmask') }}
  ipv6 address {{ item.ipv6_addr | ipaddr('net') | ipaddr('0') }}
  ipv6 enable
```

- Result:

```
interface Ethernet1/1
  no shutdown
  description TO-Customer01
  ip address 100.100.100.0 255.255.255.254
  ipv6 address 2001:DB8:100::/127
  ipv6 enable
```

```
# VARS
```

```
interface: "Ethernet1/1"
description: "TO-Customer01"
ipv4_addr: "100.100.100.0/31"
ipv6_addr: "2001:db8:100::/127"
```

# Roles for R1 - Templates

- `ios_routers/templates/ios_bgp.j2`

```
router bgp {{ item.as }}
  neighbor {{ item.ipv4_addr | ipaddr('1') | ipaddr('address') }} remote-as {{ item.peer_as }}
  neighbor {{ item.ipv4_addr | ipaddr('1') | ipaddr('address') }} description {{ item.peer_desc_v4 }}
  neighbor {{ item.ipv4_addr | ipaddr('1') | ipaddr('address') }} password {{ item.peer_auth }}
  neighbor {{ item.ipv6_addr | ipaddr('1') | ipaddr('address') }} remote-as {{ item.peer_as }}
  neighbor {{ item.ipv6_addr | ipaddr('1') | ipaddr('address') }} description {{ item.peer_desc_v6 }}
  neighbor {{ item.ipv6_addr | ipaddr('1') | ipaddr('address') }} password {{ item.peer_auth }}
  address-family ipv4 unicast
    neighbor {{ item.ipv4_addr | ipaddr('1') | ipaddr('address') }} activate
  address-family ipv6 unicast
    neighbor {{ item.ipv6_addr | ipaddr('1') | ipaddr('address') }} activate
```

- Result:

```
router bgp 65500
  neighbor 2001:DB8:100::1 remote-as 63932
  neighbor 2001:DB8:100::1 description IPv6 BGP with Customer01
  neighbor 2001:DB8:100::1 password apricot2022
  neighbor 100.100.100.1 remote-as 63932
  neighbor 100.100.100.1 description IPv4 BGP with Customer01
  neighbor 100.100.100.1 password apricot2022
  address-family ipv4
    neighbor 100.100.100.1 activate
  address-family ipv6
    neighbor 2001:DB8:100::1 activate
```

# VARS

```
as: "65500"
peer_as: "63932"
peer_desc_v4: "IPv4 BGP with Customer01"
peer_desc_v6: "IPv6 BGP with Customer01"
peer_auth: "apricot2022"
```

# Roles for R1 - Templates

- `ios_routers/templates/ios_ntp.j2`

```
{% set ntp_servers = ["192.168.0.12", "2001:db8:10::12"] %}  
{% for ntp in ntp_servers %}  
ntp server {{ ntp }}  
{% endfor %}
```

- Result:

```
ntp server 192.168.0.12  
ntp server 2001:DB8:10::12
```

# Roles for R1 - Tasks

- `ios_routers/tasks/main.yml`

```
---
- name: Configure Timezone on R1
  ios_config:
    lines:
      - clock timezone BST 6 0
    before:
      - no clock timezone
- name: Configure VTY on R1
  ios_config:
    lines:
      - transport preferred none
    parents:
      - line vty 0 4
- name: Configure interface on R1
  ios_config:
    src: templates/ios_rtr_int.j2
  with_items:
    - "{{ ios_vars }}"
- name: Configure BGP on R1
  ios_config:
    src: templates/ios_bgp.j2
  with_items:
    - "{{ ios_vars }}"
- name: Configure NTP on R1
  ios_config:
    src: templates/ios_ntp.j2
```



```
clock timezone BST 6 0

line vty 0 4
  transport preferred none

interface Ethernet1/1
  no shutdown
  description TO-Customer01
  ip address 100.100.100.0 255.255.255.254
  ipv6 address 2001:DB8:100::/127
  ipv6 enable

router bgp 65500
  neighbor 2001:DB8:100::1 remote-as 63932
  neighbor 2001:DB8:100::1 description IPv6 BGP
  with Customer01
  neighbor 2001:DB8:100::1 password apricot2022
  neighbor 100.100.100.1 remote-as 63932
  neighbor 100.100.100.1 description IPv4 BGP
  with Customer01
  neighbor 100.100.100.1 password apricot2022
  address-family ipv4
    neighbor 100.100.100.1 activate
  address-family ipv6
    neighbor 2001:DB8:100::1 activate

ntp server 192.168.0.12
ntp server 2001:DB8:10::12
```

# Roles for R2 - Vars

- `junos_routers/vars/main.yml`

```
junos_vars:  
  interface: "ge-0/0/0"  
  description: "Peering-with-Customer01"  
  unit: "0"  
  ipv4_addr: "100.100.200.0/31"  
  ipv6_addr: "2001:db8:200::/127"  
  bgp_group: "ebgp"  
  bgp_type: "external"  
  peer_as: "63932"  
  neighbor_v4: "100.100.200.1"  
  neighbor_v6: "2001:db8:200::1"  
  peer_desc_v4: "IPv4-BGP-with-Customer01"  
  peer_desc_v6: "IPv6-BGP-with-Customer01"  
  peer_auth: "apricot2022"  
  ntp_v4: "192.168.0.12"  
  ntp_v6: "2001:db8:10::12"
```

# Roles for R2 - Templates

- `junos_routers/templates/junos_rtr_int.j2`

```
set interfaces {{ item.interface }} description {{ item.description }}
set interfaces {{ item.interface }} unit {{item.unit }} family inet address {{ item.ipv4_addr }}
set interfaces {{ item.interface }} unit {{item.unit }} family inet6 address {{ item.ipv6_addr }}
```

- Result:

```
set interfaces ge-0/0/0 description Peering-with-Customer01
set interfaces ge-0/0/0 unit 0 family inet address 100.100.200.0/31
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:200::/127
```

```
# VARS
interface: "ge-0/0/0"
description: "Peering-with-Customer01"
unit: "0"
ipv4_addr: "100.100.200.0/31"
ipv6_addr: "2001:db8:200::/127"
```

# Roles for R2 - Templates

- junos\_routers/templates/junos\_bgp.j2

```
set protocols bgp group {{ item.bgp_group }} type {{ item.bgp_type }}
set protocols bgp group {{ item.bgp_group }} neighbor {{ item.neighbor_v4 }} peer-as {{ item.peer_as }}
set protocols bgp group {{ item.bgp_group }} neighbor {{ item.neighbor_v4 }} description {{ item.peer_desc_v4 }}
set protocols bgp group {{ item.bgp_group }} neighbor {{ item.neighbor_v4 }} authentication-key {{ item.peer_auth }}
set protocols bgp group {{ item.bgp_group }} neighbor {{ item.neighbor_v6 }} peer-as {{ item.peer_as }}
set protocols bgp group {{ item.bgp_group }} neighbor {{ item.neighbor_v6 }} description {{ item.peer_desc_v6 }}
set protocols bgp group {{ item.bgp_group }} neighbor {{ item.neighbor_v6 }} authentication-key {{ item.peer_auth }}
```

- Result

```
set protocols bgp group ebgp type external
set protocols bgp group ebgp neighbor 100.100.200.1 description IPv4-BGP-with-Customer01
set protocols bgp group ebgp neighbor 100.100.200.1 authentication-key apricot2022
set protocols bgp group ebgp neighbor 100.100.200.1 peer-as 63932
set protocols bgp group ebgp neighbor 2001:db8:200::1 description IPv6-BGP-with-Customer01
set protocols bgp group ebgp neighbor 2001:db8:200::1 authentication-key apricot2022
set protocols bgp group ebgp neighbor 2001:db8:200::1 peer-as 63932
```

```
#VARS
bgp_group: "ebgp"
bgp_type: "external"
peer_as: "63932"
neighbor_v4: "100.100.200.1"
neighbor_v6: "2001:db8:200::1"
peer_desc_v4: "IPv4-BGP-with-Customer01"
peer_desc_v6: "IPv6-BGP-with-Customer01"
peer_auth: "apricot2022"
ntp_v4: "192.168.0.12"
ntp_v6: "2001:db8:10::12"
```

# Roles for R2 - Tasks

- `junos_routers/tasks/main.yml`

```
---  
- name: Configure Interface on R2  
  junipernetworks.junos.junos_config:  
    src: junos_rtr_int.j2  
    comment: config interface  
  with_items:  
    - "{{ junos_vars }}"  
  
- name: Configure BGP on R2  
  junipernetworks.junos.junos_config:  
    src: junos_bgp.j2  
    comment: config bgp  
  with_items:  
    - "{{ junos_vars }}"  
  
- name: Configure NTP on R2  
  junipernetworks.junos.junos_config:  
  lines:  
    - set system ntp server {{ item.ntp_v4 }}  
    - set system ntp server {{ item.ntp_v6 }}  
  with_items:  
    - "{{ junos_vars }}"
```



```
set interfaces ge-0/0/0 description Peering-with-Customer01  
set interfaces ge-0/0/0 unit 0 family inet address 100.100.200.0/31  
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:200::/127  
  
set protocols bgp group ebgp type external  
set protocols bgp group ebgp neighbor 100.100.200.1 description IPv4-BGP-with-Customer01  
set protocols bgp group ebgp neighbor 100.100.200.1 authentication-key apricot2022  
set protocols bgp group ebgp neighbor 100.100.200.1 peer-as 63932  
set protocols bgp group ebgp neighbor 2001:db8:200::1 description IPv6-BGP-with-Customer01  
set protocols bgp group ebgp neighbor 2001:db8:200::1 authentication-key apricot2022  
set protocols bgp group ebgp neighbor 2001:db8:200::1 peer-as 63932  
  
set system ntp server 2001:db8:10::12  
set system ntp server 192.168.0.12
```



# Roles for Server01 - Templates

- `servers/templates/timezone.j2`

Asia/Dhaka

# Roles for Server01 - Tasks

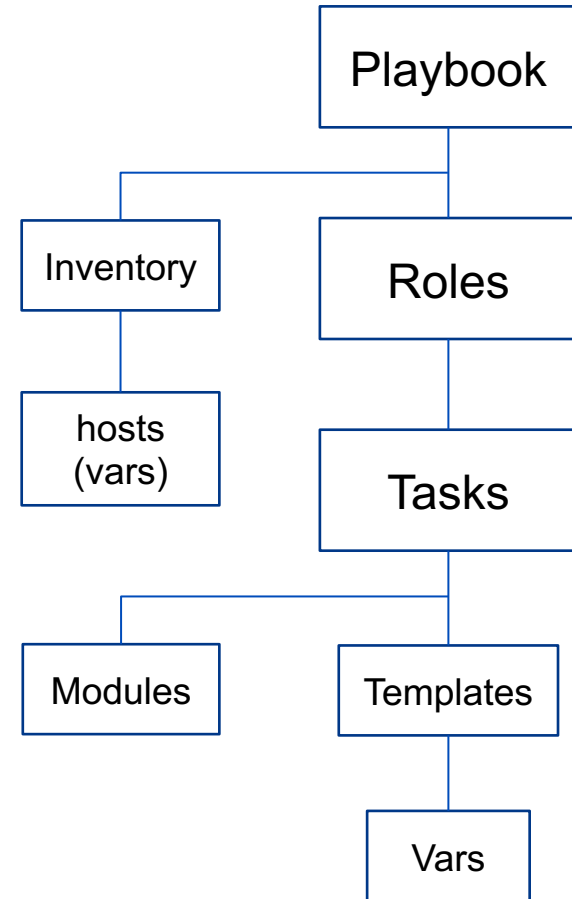
- `servers/tasks/main.yml`

```
---  
  
- name: configure timezone  
  template:  
    src: timezone.j2  
    dest: /etc/timezone  
  
- name: install ntp  
  apt: pkg=ntp state=present  
  
- name: start ntp  
  service: name=ntp state=started enabled=true
```

# Playbook – Putting it together

- apricot-lab.yml

```
---  
  
- name: IOS Router Config  
  hosts: ios_router  
  connection: network_cli  
  gather_facts: no  
  roles:  
    - ios_routers  
  
- name: JunOS Router Config  
  hosts: junos_router  
  connection: ansible.netcommon.netconf  
  gather_facts: no  
  roles:  
    - junos_routers  
  
- name: NTP Server Config  
  hosts: ubuntu_server  
  become: true  
  roles:  
    - servers
```



# View Running Config

## r1-show-conf.yml

```
---  
  
- name: Play for R1's running config  
  hosts: ios_router  
  gather_facts: no  
  connection: network_cli  
  
  tasks:  
  
  - name: Print Running Config  
    ios_command:  
      commands:  
        - show run  
    register: output  
  
  - debug: var=output
```

## r2-show-conf.yml

```
---  
  
- name: Play for R2' running config  
  hosts: junos_router  
  gather_facts: no  
  connection: network_cli  
  
  tasks:  
  
  - name: Print Running Config  
    junipernetworks.junos.junos_command:  
      commands: show configuration  
      display: set  
    register: output  
  
  - debug: var=output
```

# Backup Config

r1-backup-conf.yml

```
---  
  
- name: Play for config backup  
  hosts: ios_router  
  gather_facts: no  
  connection: network_cli  
  
  tasks:  
  
  - name: Commit and Backup  
    ios_config:  
      backup: yes  
      backup_options:  
        filename: r1-config.cfg  
        dir_path: backup  
        save_when: modified
```

r2-backup-conf.yml

```
---  
  
- name: Play for config backup  
  hosts: junos_router  
  gather_facts: no  
  connection: network_cli  
  
  tasks:  
  
  - name: Commit and Backup  
    junipernetworks.junos.junos_config:  
      confirm_commit: yes  
      backup: yes  
      backup_options:  
        filename: r2-config.cfg  
        dir_path: backup
```



# Questions

