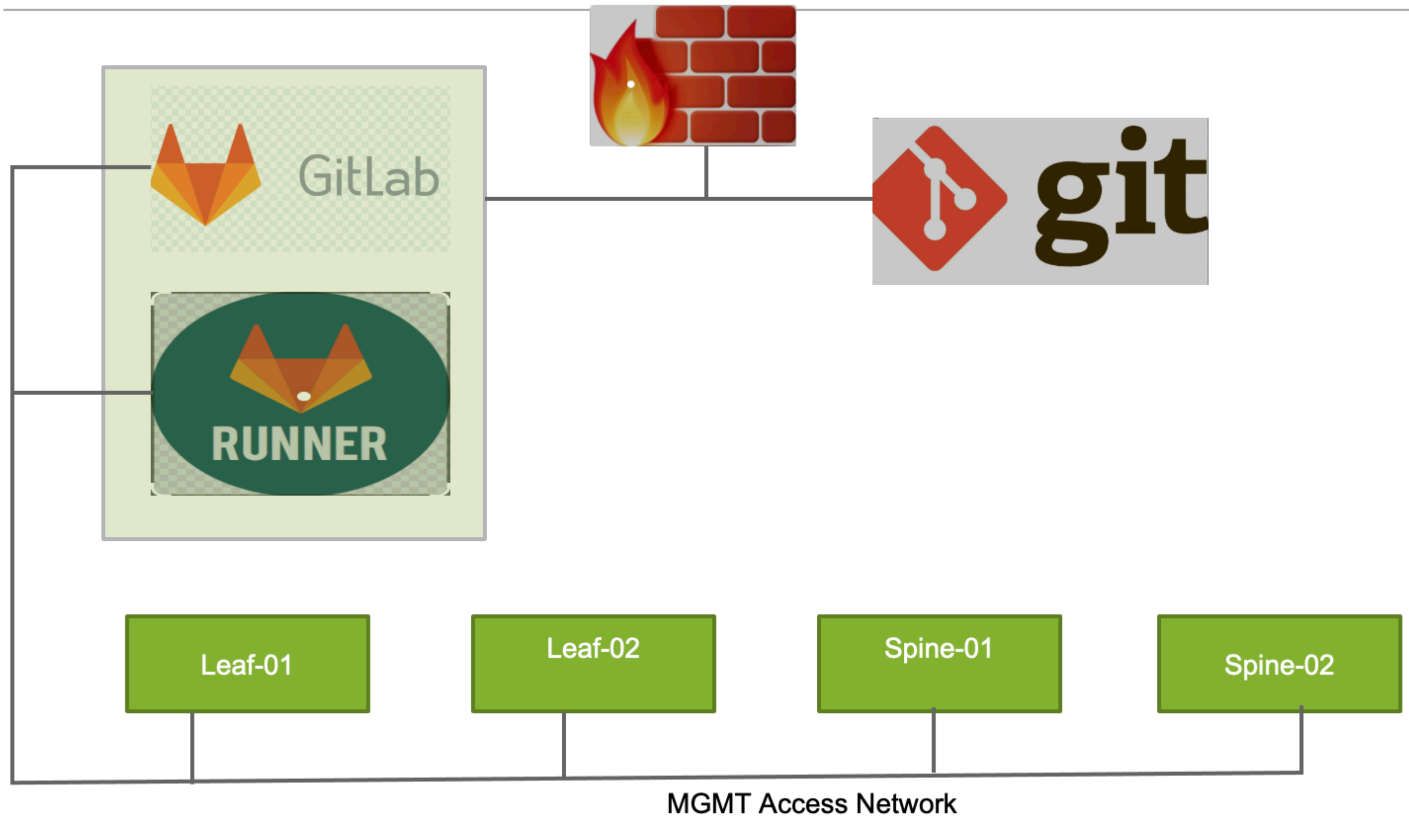
Junos IP Fabric (EVPN-VxLAN) Automation with Ansible and Gitlab CI/CD Pipeline



- My Ansible project for Junos IP-Fabric config and mgmt operations is available at ansible-junos-evpn-vxlan.
- I have also described in detail how to setup a local instance of Gitlab, Setting up Gitlab-runner with docker-executor and its integration with a local Gitlab instance [Gitlabsetup] (https://github.com/kashif-nawaz/gitlabsetup-).
- This wiki is describing how to setup Gitlab CI/CD to automate Junos IP-Fabric.

Creating a Docker Image

- Hence, I am using docker-executor in Gitlab runner, so I need to build a docker image which will be used to run CI/CD jobs.
- Because my original ansible-junos-evpn-vxlan project was tested with these packages, I used a Centos:7 base image, Python 2.7, and Ansible 2.8.3. Ideally, I should have used the latest Centos/Ubuntu and Python3 (I will give it a try at some later time).

```
cat << EOF > Dockerfile
#Download base image Centos7
FROM centos:7
RUN yum  -y update
RUN yum install -y openssh-clients vim
RUN yum -y install https://packages.endpointdev.com/rhel/7/os/x86_64/endpoint-repo.x86_64.rpm
RUN yum install git -y
RUN curl "https://bootstrap.pypa.io/pip/2.7/get-pip.py" -o get-pip.py
RUN python get-pip.py
RUN pip install --upgrade pip
RUN pip install --upgrade setuptools
RUN yum install python-devel libxml2-devel libxslt-devel gcc openssl libffi-devel -y
RUN pip install ansible==2.8.3
RUN pip install junos-eznc
RUN pip install jinja2
RUN pip install jxmlease
RUN ansible-galaxy install Juniper.junos
WORKDIR /root/
CMD ["/bin/bash"]
EOF

docker build -t centos7:junos-atomation2.7-v2 .
Successfully built 2dff8e2c18a0
Successfully tagged centos:7
docker tag 2dff8e2c18a0  gitlab.knawaz.lab.jnpr:5050/knawaz/junos-automation/centos7:junos-automation2.7-v2

In the above URL (gitlab.knawaz.lab.jnpr is my Gitlab server DNS entry, 5050 is the port where Docker Registry is listening, knawaz
docker push gitlab.knawaz.lab.jnpr:5050/knawaz/junos-automation/centos7:junos-automation2.7-v2
```

- Once a docker image is pushed into the Gitlab docker registry , then it's ready for usage in the Gitlab CI/CD pipeline.

Using SSH keys with GitLab CI/CD

- Gitlab runner (e.g docker-executor) needs to access managed devices via ssh (e.g. IP-Fabric spine and leaf devices) for config tasks.
- To meet above requirement ssh public should have been added in spine and leaf devices and corresponding ssh pvt needs to be added as CI/CD variable so that docker-executor can use it to access the managed devices during CI/CD jobs execution.
- To refer ssh pvt key in CI/CD job ssh-pvt-key
- Deploy key which is ssh public key is also required with read-write access as 1st job defined in.gitlab-ci.yml requires write access to this git lab repo to push changes into ansible-junos-evpn-vxlan project.

Setting Up .gitlab-ci.yml

- .gitlab-ci.yml file must be placed at the root of the project and it is used to create stages and jobs that define the Gitlab CI/CD pipeline .gitlab-ci.yml

Image

- Docker container image which will be used by docker-executor to create containers in order to run CI/CD jobs.

```
image: "gitlab.knawaz.lab.jnpr:5050/knawaz/junos-automation/centos7:junos-atomation2.7-v2"
```

Stages

- Stages sequence has signifiance during pipeline execution
- This project has the following stages, and each stage maps to a role in [ansible-junos-evpn-vxlan] (https://github.com/kashif-nawaz/ansible-junos-evpn-vxlan).

```
stages:
  - generate_ip_fabric_config
  - fabric_mgmt_access_check
  - fabric_links_status_check
  - fabric_underlay_interfaces_config_push
  - fabric_underlay_interfaces_icmp_check
  - fabric_underlay_ebgp_config_push
  - fabric_ebgp_status_check
  - fabric_overlay_ibgp_config_push
  - fabric_ibgp_status_check
  - fabric_tenant_config_push
  - fabric_vtep_status_check
  - fabric_esi_lag_config_push
  - fabric_esi_lag_status_check
```

Variables

- Section for variables declaration.

Jobs

- It defines actual scripits which will be executed by docker containers (responsible for running each stage and jobs included in it). Gitlab Pipeline
- A sample job is provided below. The tag value must match one of the tags specified during Gitlab runner registration.

```
fabric_links_status_check_job:  #Job name
  stage: fabric_links_status_check #stage name
  script: #scripit to be executed
    - eval $(ssh-agent -s) #starting ssh-agent
    - echo "$SSH_PRIVATE_KEY" | tr -d '\r' | ssh-add - #pushing ssh pvt key into docker-executor instance
    - mkdir -p ~/.ssh
    - chmod 700 ~/.ssh
    - ansible-playbook -i ansible-junos-evpn-vxlan/inventory/lab/hosts.yml  -u kashif --private-key=~/.ssh/id_rsa  ansible-junos-evp
  tags:  #tag has significance with regards tags added during gitlab-runner registration
    - automation
```

How to Join All These Pieces Together?

- Install Gitlab by following the URL gitlabsetup *Create your username group and project (e.g. group name "lab", project name "junos-automation") and user-name as per your choice [group] (https://docs.gitlab.com/ee/user/group/).
- Install Gitlab runner and docker-executor using [gitlabsetup] (https://github.com/kashif-nawaz/gitlabsetup-).
- Create a Docker image and push it to your Gitlab Docker Registry [Building Docker Image] (Creating a Docker Image).
- Configure gitlab ssh-key as explained in SSH keys
- Copy the contents of .gitlab-ci.yml from this project and add them to your project.
- Get the [ansible-junos-evpn-vxlan] tarball (https://github.com/kashif-nawaz/ansible-junos-evpn-vxlan) as a tgz file and untar it into your gitlab project.

```
cd junos-automation
wget https://github.com/kashif-nawaz/ansible-junos-evpn-vxlan/archive/master.tar.gz
tar -xzf master.tar.gz
```

```
mv ansible-junos-evpn-vxlan-master/ ansible-junos-evpn-vxlan
```

- If everything is set, then add the changes to your Gitlab project and your pipeline should start.

Did I cover every thing

- The answer is yes or no. I went over how to set up Gitlab, Gitlab runner, and pipeline, etc.
- I also covered how you can import my ansible-junos-evpn-vxlan project into your Gitlab CI/CD project.
- But where is the underlay fabric? I did not cover that and I am assuming that you have fabric ready with mgmt access.