21BCE7836

CYBER PHYSICAL SYSTEM PROJECT REPORT

Elasticsearch, Logstash, Kibana Deployment

Deploying the Elasticsearch-Logstash-Kibana (ELK) stack involves setting up and configuring Elasticsearch for data storage and searching, Logstash for data processing and enrichment, and Kibana for data visualization. This stack is commonly used for log and event data analysis. Here's a high-level overview of the deployment process

Before installation of ELK do set up for dependencies required :

Ubuntu version

```
an@an-VirtualBox: $ sudo su
[sudo] password for an:
root@an-VirtualBox:/home/an# lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description: Ubuntu 22.04.3 LTS
Release: 22.04
Codename: jammy
root@an-VirtualBox:/home/an#
```

Java dependencies install

```
other options.
root@an-VirtualBox:/home/an# apt install default-jdk default-jre -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
default-jdk is already the newest version (2:1.11-72build2).
default-jre is already the newest version (2:1.11-72build2).
```

Check java version

```
root@an-VirtualBox:/home/an# javac -version
javac 11.0.20
```

Make sure that curl installed if not then install curl

```
Try 'install --help' for more information.
root@an-VirtualBox:/home/an# apt-get install curl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
curl is already the newest version (7.81.0-1ubuntu1.13).
0 upgraded, 0 newly installed, 0 to remove and 3 not upgraded.
```

Add the elasticsearch APT repository key by using the below command (run these commands in root privilege).

```
rootgan-VirtualBox:/nome/an# javac -version
javac 11.0.20
rootgan-VirtualBox:/home/an# curl -fsSL https://artifacts.elastic.co/GPG-KEY-elasticsearch | apt-key add -
Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).
OK
```

Add the Elastic Search to the APT source List by using the below command

OK root@an-VirtualBox:/home/an# echo "deb https://artifacts.elastic.co/packages/7.x/apt stable main" > /etc/apt/sources.list.d/ elastic-7.x.list bash: /etc/apt/sources.list.d/: Is a directory

Installation of Elastic search:

apt update

```
bash: /etc/apt/sources.list.d/: Is a directory root@an-VirtualBox:/home/an# apt update Hit:1 http://in.archive.ubuntu.com/ubuntu jammy InRelease Hit:2 http://security.ubuntu.com/ubuntu jammy-security InRelease Hit:3 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease Hit:4 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease Reading package lists... Done Building dependency tree... Done Reading state information... Done 2 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

Install elastic search

```
oot@an-VirtualBox:/home/an# apt install elasticsearch -y
eading package lists... Done
uilding dependency tree... Done
eading state information... Done
he following NEW packages will be installed:
elasticsearch
upgraded, 1 newly installed, 0 to remove and 2 not upgraded.
eed to get 318 MB of archives.
fter this operation, 331 MB of additional disk space will be used.
et:1 https://artifacts.elastic.co/packages/7.x/apt stable/main amd64 elasticsearch amd64 7.17.12 [318 MB]
etched 318 MB in 2min 43s (1,951 kB/s)
electing previously unselected package elasticsearch.
Reading database ... 16384B files and directories currently installed.)
reparing to unpack .../elasticsearch_7.17.12_amd64.deb ...
reating elasticsearch group... OK
reating elasticsearch user... OK
npacking elasticsearch (7.17.12) ...
etting up clasticsearch company installation, please execute the following statements to configure elasticsearch service to start automatically using system
sudo systemctl enable elasticsearch.service
## You can start elasticsearch service by executing
sudo systemctl enable elasticsearch.service
reated elasticsearch keystore in /etc/elasticsearch/elasticsearch.keystore
```

Configuration of elasticsearch

```
pot@an-VirtualBox:/home/an# nano /etc/elasticsearch/elasticsearch.yml
```

Configure the JVM heap memory by using the below command

oot@an-VirtualBox:/home/an# nano /etc/elasticsearch/jvm.options

Restart elasticsearch

root@an-VirtualBox:/home/an# systemctl restart elasticsearch

Enable elastic search

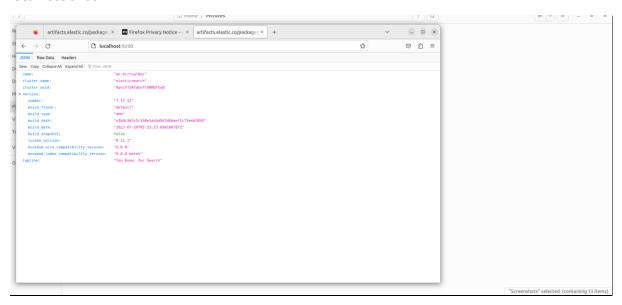
Executing: /lib/systemd/systemd-sysv-install enable elasticsearch
Created symlink /etc/systemd/system/multi-user.target.wants/elasticsearch.service →/lib/systemd/system/elasticsearch.service
root@an-VirtualBox:/home/an#

Ping the Elastic Search to verify installation by using the below command

```
root@an-VirtualBox:/nome/an# curl -X GEI "Localhost:9200"
{
    "name" : "an-VirtualBox",
    "cluster_name" : "elasticsearch",
    "cluster_uuid" : "9pnzY73ATqGnYlXBRDFSyQ",
    "version" : {
        "number" : "7.17.12",
        "build_flavor" : "default",
        "build_tash" : "e3b0c3d3c5c130e1dc6d567d6baef1c73eeb2059",
        "build_hash" : "e3b0c3d3c5c130e1dc6d567d6baef1c73eeb2059",
        "build_hash" : "e3b0c3d3c5c130e1dc6d567d6baef1c73eeb2059",
        "build_shash" : "e3b0c3d3c5c130e1dc6d567d6baef1c73eeb2059",
        "b01d_shash" : "e3b0c3d3c5c130e1dc6d567d6baef1c73eeb2059",
        "b01d_shash" : "e3b0c3d3c5c130e1dc6d567d6baef1c73eeb2059",
        "b01d_shash
```

Search on browser:

localhost:9200



Installation of logstash

```
root@an-VirtualBox:/home/an# apt install logstash -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
    logstash
    0 upgraded, 1 newly installed, 0 to remove and 2 not upgraded.
    Need to get 366 MB of archives.
    After this operation, 623 MB of additional disk space will be used.
    Get:1 https://artifacts.elastic.co/packages/7.x/apt stable/nain amd64 logstash amd64 1:7.17.12-1 [366 MB]
    Fetched 366 MB in 2min 49s (2,167 kB/s)
    Selecting previously unselected package logstash.
    (Reading database ... 166886 files and directories currently installed.)
    Preparing to unpack .../logstash [1:7.17.12-1] ...
    Setting up logstash (1:7.17.12-1) ...
    Setting up logstash (1:7.17.12-1) ...
    Setting up logstash (1:7.17.12-1) ...
    Sundled JDK: /usr/share/logstash/jdk
    Using bundled JDK: /usr/share/logstash/jdk
    Using provided startup.options file: /etc/logstash/startup.options
    OpenJDK 64-Bit Server VM warning: Option UseConcMarkSweepGC was deprecated in version 9.0 and will likely be removed in a future release.
    /usr/share/logstash/vendor/bundle/jruby/2.5.0/gems/pleaserun-0.0.32/lib/pleaserun/platform/base.rb:112: warning: constant ::Fixnum is deprecated Successfully created system startup script for Logstash
    root@an-VirtualBox:/home/an#
```

Checking that logstash is working or not:

```
bot@an-VirtualBox:/home/an# systemctl status logstash
ilogstash.service - logstash
Loaded: loaded (/etc/system/logstash.service; enabled; vendor preset: enabled)
Active: active (running) since Med 2023-00-23 17:07:14 IST; 11s ago
Main PID: 10005 (Java)
Tasks: 18 (Linit: 4009)
Menory: 506.5M
CPU: 506.53S
CGroup: [system.slice/logstash.service
- 10005 [system.slice/logstash.service
- 10005 [system.slice/logstash.service
- 10005 [system.slice/logstash/jdk/bin/java - Xmsig - XX:+UseConcMarkSweepGC - XX:CMSInitiatingOccupancyFraction=75 - XX:+UseCMSInitiatingOccupancyOnly - Djava.awt.headless=true - Dfile.encodi

ug 23 17:07:14 an-VirtualBox systemd[1]: Started logstash.

ug 23 17:07:14 an-VirtualBox logstash[16065]: Using bundled JDK: /usr/share/logstash/jdk
ug 23 17:07:14 an-VirtualBox logstash[16065]: Using bundled JDK: /usr/share/logstash/jdk
ug 23 17:07:14 an-VirtualBox logstash[16065]: OpenJDK 64-Blt Server VM warning: Option UseConcMarkSweepGC was deprecated in version 9.0 and will likely be removed in a future release.

lnes 1-13/13 (END)
```

Kibana Set up

```
bash: /etc/apt/sources.list.d/: Is a directory root@an-VirtualBox:/home/an# apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://security.ubuntu.com/ubuntu jammy-security InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

Kibana Installation

```
root@an-VirtualBox:/home/an# apt install kibana -y
Reading package lists... Done
Banding state information... Done
The following NEW packages will be installed:
    kibana
    upgraded, 1 newly installed, 0 to renove and 2 not upgraded.
    Need to get 276 MB of archives.
    After this operation, 673 MB of additional disk space will be used.
    Get:1 https://artifacts.elastic.co/packages/7.x/apt stable/main and04 kibana and64 7.17.12 [276 MB]
    fetched 276 MB in Zmin 15s (2,040 kB/s)
    selecting previously unselected package kibana.
    (Reading database ... 182259 files and directories currently installed.)
    Preparing to unpack .../kibana _7.17.12_and64.deb ...
    Umpacking kibana (7.17.12) ...
    Setting up kibana (7.17.12) ...
    Setting up kibana (7.17.12) ...
    Setting up kibana (7.17.12) ...
    Creating kibana group... OK
    Creating kibana user... OK
    Creating kibana kystore tn /etc/kibana/kibana.keystore
    root@an-VirtualBox:/home/an#
```

Before Configuration set up make sure that you stop all services

Stop kibana

sudo systemstl stop kibana

Stop Elasticsearch

Sudo systemctl stop elasticsearch

Configuration

open to elasticsearch.yml

sudo nano /etc/elasticsearch/elasticsearch.yml

oot@an-VirtualBox:/home/an# nano /etc/elasticsearch/elasticsearch.yml

Add to elasticsearch.yml:

xpack.security.enabled: true

xpack.security.authc.api_key.enabled: true

Now restart elasticsearch

sudo systemctl restart elasticsearch

```
[sudo] password for an:
root@an-VirtualBox:/home/an# systemctl start elasticsearch
```

Set up default password:

cd usr/share/elasticsearch/bin

sudo ./elasticsearch-setup-passwords auto

Make sure you give elastic user name and password

```
root@an-VirtualBox:/home/an# vim /etc/kibana/kibana.yml
Poot@an-VirtualBox:/home/an#
```

Give elasticsearch username and password

```
#Ribana.index: ".kibana"

# The default application to load.
#klbana.defaultApplid: "home"

# If your ElastIcsearch is protected with basic authentication, these settings provide
# the username and password that the Kibana server uses to perform maintenance on the Kibana
# index at startup. Your Kibana users still need to authenticate with Elasticsearch, which
# is proxied through the Kibana server.
elasticsearch.username: "elasticsearch"
elasticsearch.password: "pass"

# Kibana can also authenticate to Elasticsearch via "service account tokens".
# If may use this token instead of a username/password.
# elasticsearch.serviceAccountToken: "my_token"
```

Configure kibana uncomment server port and host

```
root@an-VirtualBox:/home/an# vim /etc/kibana/kibana.yml
Poot@an-VirtualBox:/home/an#
```

Save the changes and restart kibana

Systemctl restart kibana

```
7:19:44 an-VirtualBox systemd[1]: Started Kibana.

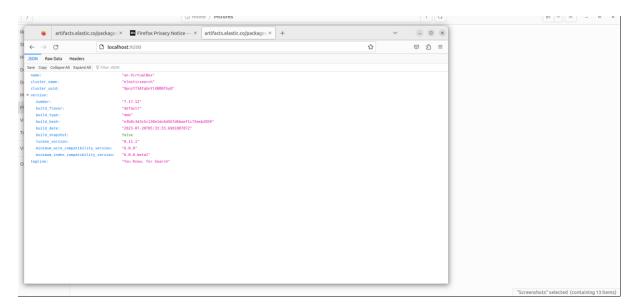
12/12 (END)
opped systemctl status kibana
: systemstl stop kibana
```

Give a command sudo systemctl status elasticseach logstash kibana

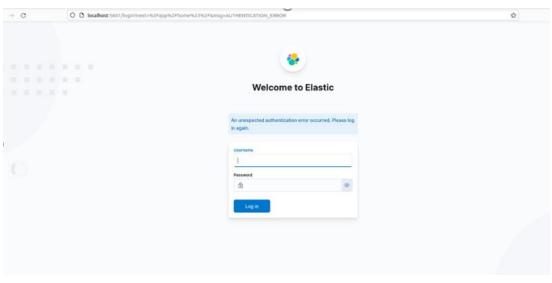
```
Dogstash, service - Logstash
Loaded: Loaded (Jetc/systend/systen/Logstash.service; enabled; vendor preset: enabled)
Active: active (running) stnce Med 2023-08-23 17:07:14 IST; 11s ago
Main PID: 16065 (Java)
Tasks: 18 (Linit: 4609)
Menory: 566.5M
CPU: 36.453s
CGroup: /systen.sitce/logstash.service
Logstash.service
Logstash.servi
```

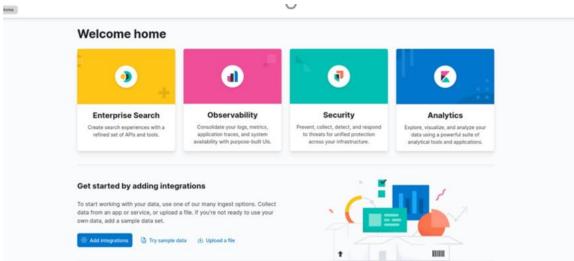
Open browser on ubuntu

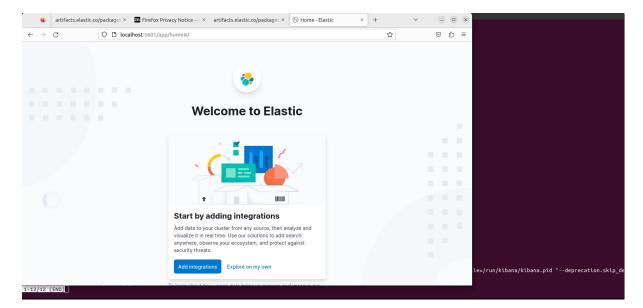
Search localhost:9200



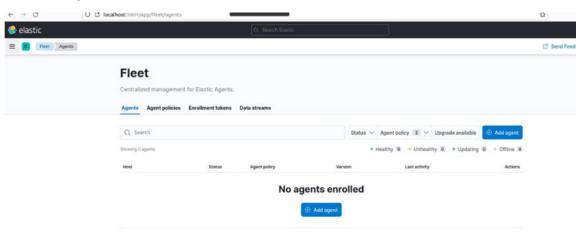
localhost:5200



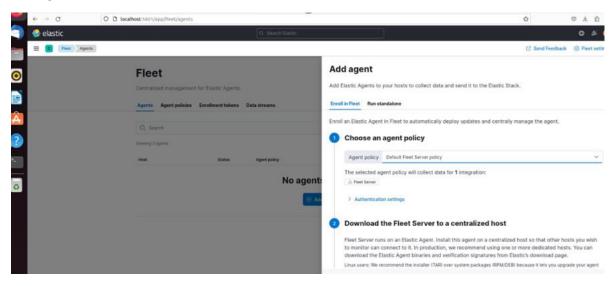




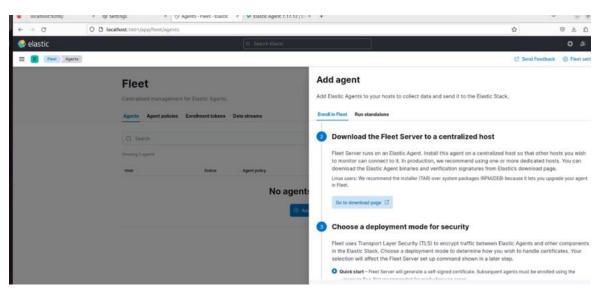
Go to management> FLEET



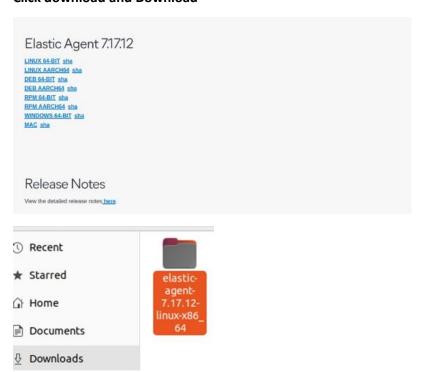
Add agent



Download fleet centralised host



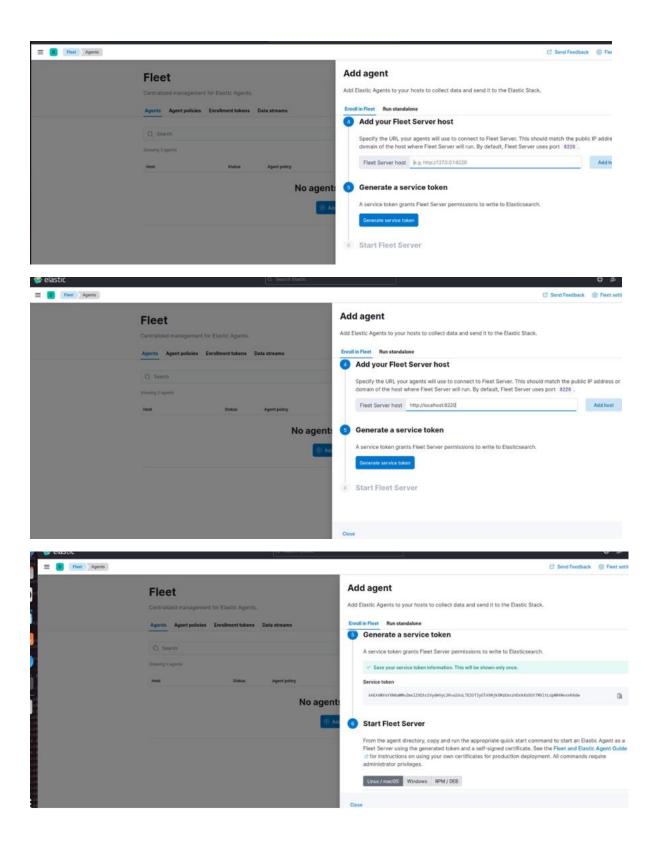
Click download and Download

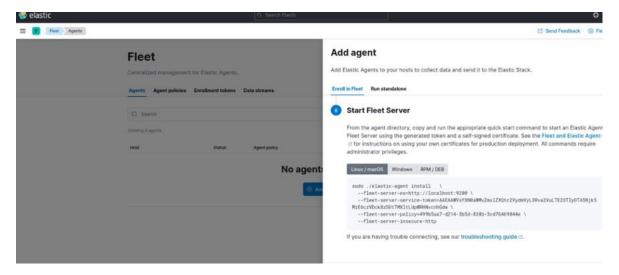


Add yours fleet host server

Fleet Server host: http://localhost:8220 then click on add host

Complete the following steps:





Copy commands and give those command in ubuntu terminal (give commands related to which environment based elastic agent you downloaded)

Go to the path of elastic agent and paste the fleet server commands

Fleet server hosted



Make sure zeek logs are running

root@an-VirtualBox:/home/an# /opt/zeek/bin# .zeek deploy

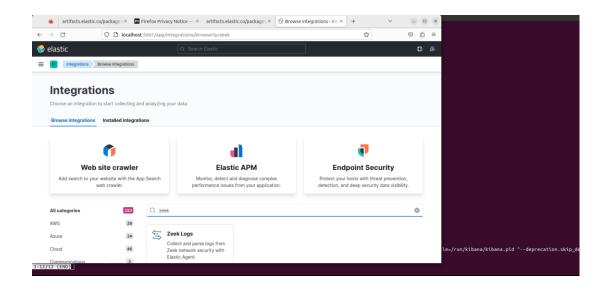
```
checking configurations ...
installing ...
removing old policies in /opt/zeek/spool/installed-scripts-do-not-touch/site ...
removing old policies in /opt/zeek/spool/installed-scripts-do-not-touch/auto ...
creating policy directories ...
installing site policies ...
generating standalone-layout.zeek ...
generating local-networks.zeek ...
generating zeekctl-config.zeek ...
generating zeekctl-config.sh ...
stopping ...
stopping zeek ...
creating crash report for previously crashed nodes: zeek
starting ...
starting zeek ...
```

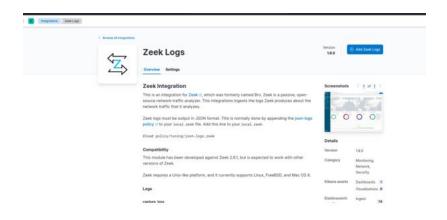
Go to local.zeek and add a line @load policy/tuning/json_logs.zeek

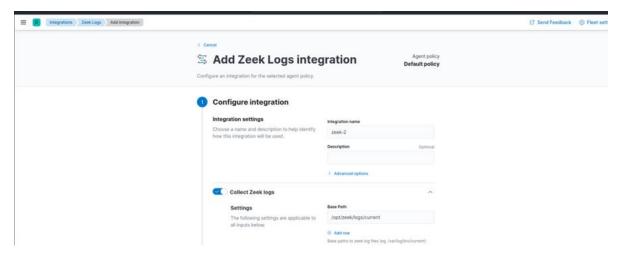
Add at the end of the file @load policy/tuning/json-logs.zeek → to solve error of getting zeek logs

Restart zeek

Go to integrations>> search zeek logs



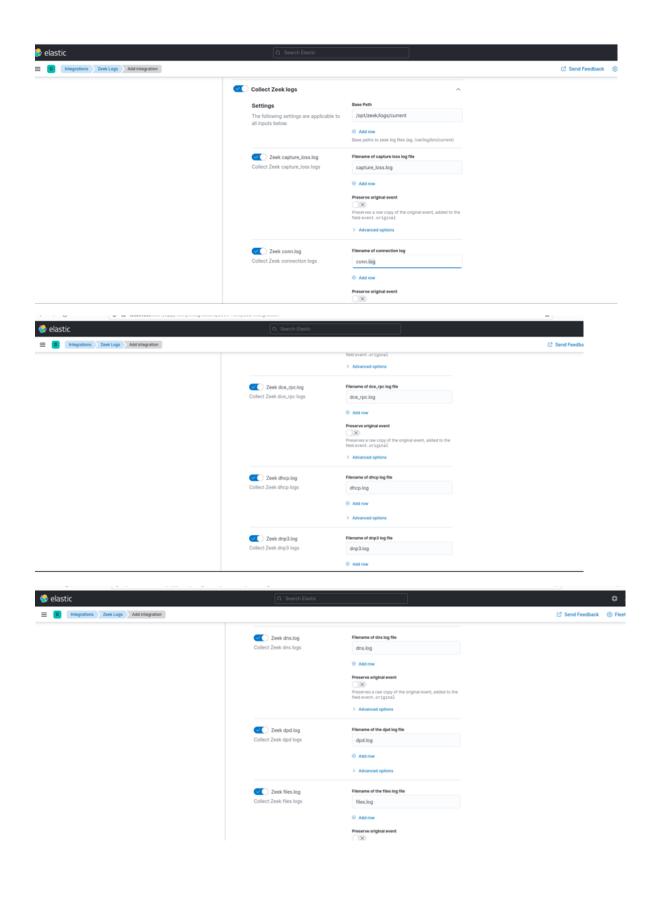


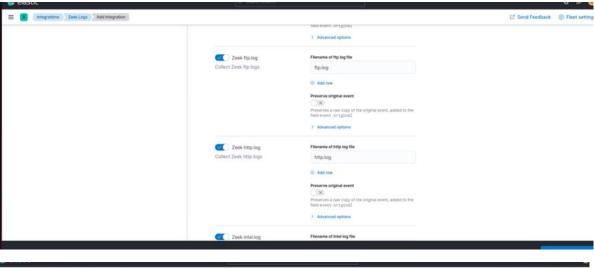


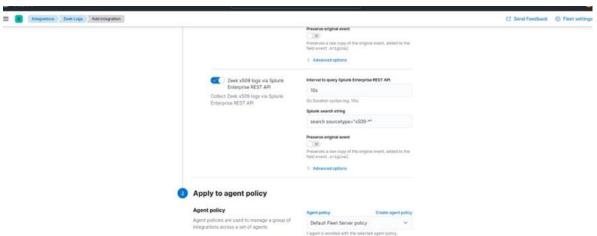
Give the path where zeek logs stored

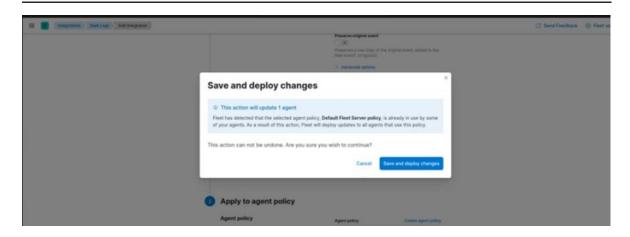
root@an-VirtualBox:/home/an# opt/zeek/logs/currents#ls

```
Regitable (empty)
Inteld (empty)
Int
```









Go to discover

