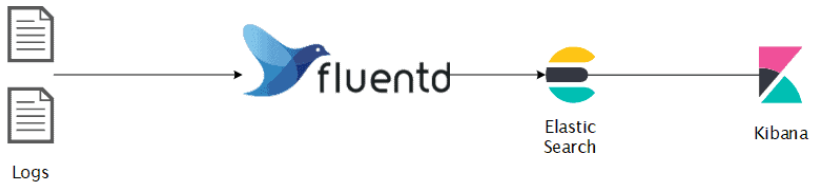
EFK Setup Using HELM – Kubernetes

-> EFK is a suite of tools combining Elasticsearch, Fluentd and Kibana to manage logs

-> Fluentd will collect the logs and send them to Elasticsearch. This latter will receive the logs and save it on its database

-> Kibana will fetch the logs from Elasticsearch and display it on a nice web app

Note: All three components are available as binaries or as Docker containers



-> We are going to download and install below 3 components in our Kubernetes Cluster

1) Elastic Search

2) Fluent Bit

3) Kibana


```
[ec2-user@ip-172-31-6-228 efk-demo]$ ls -l
total 64
drwxr-xr-x. 4 ec2-user ec2-user   188 Nov 12 10:08 elasticsearch
-rw-r--r--. 1 ec2-user ec2-user 27894 Mar  8  2022 elasticsearch-7.17.1.tgz
drwxr-xr-x. 5 ec2-user ec2-user   124 Nov 12 10:28 fluent-bit
-rw-r--r--. 1 ec2-user ec2-user 12765 Nov  9 21:52 fluent-bit-0.21.0.tgz
drwxr-xr-x. 4 ec2-user ec2-user   128 Nov 12 10:46 kibana
-rw-r--r--. 1 ec2-user ec2-user 10364 Apr 21  2022 kibana-7.17.3.tgz
-rw-r--r--. 1 ec2-user ec2-user   314 Nov 12 09:57 pv.yml
-rw-r--r--. 1 ec2-user ec2-user   142 Nov 12 12:20 storage-class.yml
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
```

Elastic Search Installation

Step-1: Create manifest file to create Storage Class with either host path or NFS Server (I am using hostpath)

```yaml
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: dev-storage-class
  namespace: logging
provisioner: kubernetes.io/hostpath
```

Step-2 : Create Storage Class using above manifest file

```
total 64
drwxr-xr-x. 4 ec2-user ec2-user   128 Nov 12 13:28 elasticsearch
-rw-r--r--. 1 ec2-user ec2-user 27894 Mar  8  2022 elasticsearch-7.17.1.tgz
drwxr-xr-x. 5 ec2-user ec2-user   124 Nov 12 10:28 fluent-bit
-rw-r--r--. 1 ec2-user ec2-user 12765 Nov  9 21:52 fluent-bit-0.21.0.tgz
drwxr-xr-x. 4 ec2-user ec2-user   128 Nov 12 10:46 kibana
-rw-r--r--. 1 ec2-user ec2-user 10364 Apr 21  2022 kibana-7.17.3.tgz
-rw-r--r--. 1 ec2-user ec2-user   314 Nov 12 09:57 pv.yml
-rw-r--r--. 1 ec2-user ec2-user   142 Nov 12 12:20 storage-class.yml
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$ kubectl apply -f storage-class.yml
```

Step-3: check the storage class is created or not

```
[ec2-user@ip-172-31-6-228 efk-demo]$ kubectl get sc
NAME                PROVISIONER             RECLAIMPOLICY   VOLUMEBINDINGMODE      ALLOWVOLUMEEXPANSION   AGE
dev-storage-class   kubernetes.io/hostpath  Delete          Immediate              false                  3h36m
gp2 (default)       kubernetes.io/aws-ebs   Delete          WaitForFirstConsumer   false                  5h13m
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
```

Step-4: Create Namespace (Namespace name : logging)

Command To Create Namespace : $ kubectl create namespace logging

Command To check Namespace : $ kubectl get ns

```
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$ kubectl get ns
NAME              STATUS   AGE
default           Active   5h16m
kube-node-lease   Active   5h16m
kube-public       Active   5h16m
kube-system       Active   5h16m
logging           Active   3h39m
medilab-app-ns    Active   3h48m
medilab-db-ns     Active   3h58m
[ec2-user@ip-172-31-6-228 efk-demo]$
```

Step-5: Create Persistent Volume Manifest File using above Storage Class and namespace and they apply it

```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: elasticsearch-master
  namespace: logging
  labels:
    app: elasticsearch-master
spec:
  capacity:
    storage: 20Gi
  accessModes:
    - ReadWriteOnce
  storageClassName: dev-storage-class
  persistentVolumeReclaimPolicy: Retain
  hostPath:
   path: /tmp/
```

```
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$ kubectl apply -f pv.yml
persistentvolume/elasticsearch-master unchanged
[ec2-user@ip-172-31-6-228 efk-demo]$
```

Step-6: check the PV created

```
root@ip-172-31-5-221:~/elasticsearch# kubectl get pv -n logging
NAME                   CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS        CLAIM
            STORAGECLASS        REASON   AGE
elasticsearch-master   20Gi       RWO            Retain           Available
            dev-storage-class            27s
```

Step-7: Download and extract the elastic search using the below commands

Command To Download : $ wget https://helm.elastic.co/helm/elasticsearch/elasticsearch-7.17.1.tgz

Command To Extract : $ tar -xvf elasticsearch-7.17.1.tgz

```
drwxr-xr-x  4 root root     4096 Nov 11 16:37 elasticsearch
```

Step-8: Go inside the elasticsearch directory and edit the values.yml file to include the storage class and also to verify the volume is within the range of volume we created in above step.

Note: By default we don't get this storageClassName attribute , we need to add it with the storage class we created.

```
root@ip-172-31-5-221:~/elasticsearch# ls -l
total 92
-rw-r--r--  1 root root   341 Mar  8  2022 Chart.yaml
-rw-r--r--  1 root root    29 Mar  8  2022 Makefile
-rw-r--r--  1 root root 49860 Mar  8  2022 README.md
-rw-r--r--  1 root root   194 Nov 11 16:31 custom-storage-class.yml
drwxr-xr-x 14 root root  4096 Nov 11 14:58 examples
-rw-r--r--  1 root root   315 Nov 11 16:37 pv.yml
-rw-r--r--  1 root root   222 Nov 11 16:22 pvc.yml
drwxr-xr-x  3 root root  4096 Nov 11 14:58 templates
-rw-r--r--  1 root root  9542 Nov 12 09:23 values.yaml
root@ip-172-31-5-221:~/elasticsearch#
```

```
volumeClaimTemplate:
  accessModes: ["ReadWriteOnce"]
  storageClassName: "dev-storage-class"
  resources:
    requests:
      storage: 5Gi

rbac:
  create: false
  serviceAccountAnnotations: {}
  serviceAccountName: ""
  automountToken: true
```

Step-3: After we modify the values.yml file, install elasticsearch using below command (here we are giving modified values.yml and our custom namespace)

$ helm install elasticsearch-repo . -f values.yaml -n logging

```
root@ip-172-31-5-221:~/elasticsearch# helm install elasticsearch-repo . -f values.yaml -n logging
NAME: elasticsearch-repo
LAST DEPLOYED: Sat Nov 12 09:30:50 2022
NAMESPACE: logging
STATUS: deployed
REVISION: 1
NOTES:
1. Watch all cluster members come up.
  $ kubectl get pods --namespace=logging -l app=elasticsearch-master -w2. Test cluster health using He
lm test.
  $ helm --namespace=logging test elasticsearch-repo
root@ip-172-31-5-221:~/elasticsearch#
```

Fluent – Bit Installation

Step-1: Download fluent-bit from below URL & Extract it using below commands

$ wget https://github.com/fluent/helm-charts/releases/download/fluent-bit-0.21.0/fluent-bit-0.21.0.tgz

$ tar -xvf fluent-bit-0.21.0.tgz

Step-2: Go inside fluent-bit extracted directory and Install fluent-d using helm with below command

$ helm install fluent-bit . -f values.yaml -n logging

```
[ec2-user@ip-172-31-6-228 fluent-bit]$
[ec2-user@ip-172-31-6-228 fluent-bit]$
[ec2-user@ip-172-31-6-228 fluent-bit]$ helm install fluent-bit . -f values.yaml -n logging
```

Kibana Setup

Step-1: Download Kibana from below URL & Extract it

$ wget https://helm.elastic.co/helm/kibana/kibana-7.17.3.tgz

$ tar -xvf kibana-7.17.3.tgz

Step-2 : Go inside kibana directory and edit values.yml file to change Service Type & Node Port

Default Service Type : Cluster IP

Changed To : Node Port

Note: We have given NodePort as “30002” (Enable this port in Security Group) (If you don’t give nodport then it will generate random node port)

```
updateStrategy:
  type: "Recreate"

service:
  type: NodePort
  loadBalancerIP: ""
  port: 5601
  nodePort: 30002
  labels: {}
  annotations:
    {}
    # cloud.google.com/load-balancer-type: "Internal"
    # service.beta.kubernetes.io/aws-load-balancer-internal: 0.0.0.0/0
    # service.beta.kubernetes.io/azure-load-balancer-internal: "true"
    # service.beta.kubernetes.io/openstack-internal-load-balancer: "true"
    # service.beta.kubernetes.io/cce-load-balancer-internal-vpc: "true"
  loadBalancerSourceRanges:
    []
```

$ helm install kibana . -f values.yaml -n logging

```
[ec2-user@ip-172-31-6-228 kibana]$
[ec2-user@ip-172-31-6-228 kibana]$
[ec2-user@ip-172-31-6-228 kibana]$ helm install kibana . -f values.yaml -n logging
```

Step-3: Check Services created using below command

```
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$
[ec2-user@ip-172-31-6-228 efk-demo]$ kubectl get svc -n logging
NAME                          TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)             AGE
elasticsearch-master          ClusterIP   10.100.210.186   <none>        9200/TCP,9300/TCP   46m
elasticsearch-master-headless ClusterIP   None             <none>        9200/TCP,9300/TCP   46m
fluent-bit                    ClusterIP   10.100.222.200   <none>        2020/TCP            18m
kibana-kibana                 NodePort    10.100.202.64    <none>        5601:30002/TCP      15m
[ec2-user@ip-172-31-6-228 efk-demo]$
```

Step-4: check the nodes in which Kibana pod is running

```
[ec2-user@ip-172-31-6-228 efk-demo]$ kubectl get pods -o wide -n logging
NAME                           READY   STATUS    RESTARTS   AGE   IP               NODE                                          NOMINA
TED NODE   READINESS GATES
elasticsearch-master-0         1/1     Running   0          48m   192.168.178.149  ip-192-168-191-181.ap-south-1.compute.internal  <none>
           <none>
elasticsearch-master-1         0/1     Pending   0          44m   <none>           <none>                                        <none>
           <none>
fluent-bit-nhh72               1/1     Running   0          19m   192.168.66.64    ip-192-168-80-66.ap-south-1.compute.internal    <none>
           <none>
fluent-bit-sljm6               1/1     Running   0          19m   192.168.183.41   ip-192-168-191-181.ap-south-1.compute.internal  <none>
           <none>
kibana-kibana-864bccc7f5-ktllc 1/1     Running   0          16m   192.168.123.160  ip-192-168-80-66.ap-south-1.compute.internal    <none>
           <none>
[ec2-user@ip-172-31-6-228 efk-demo]$
```

Step-5: Access Kibana Dashboard using Node Public IP