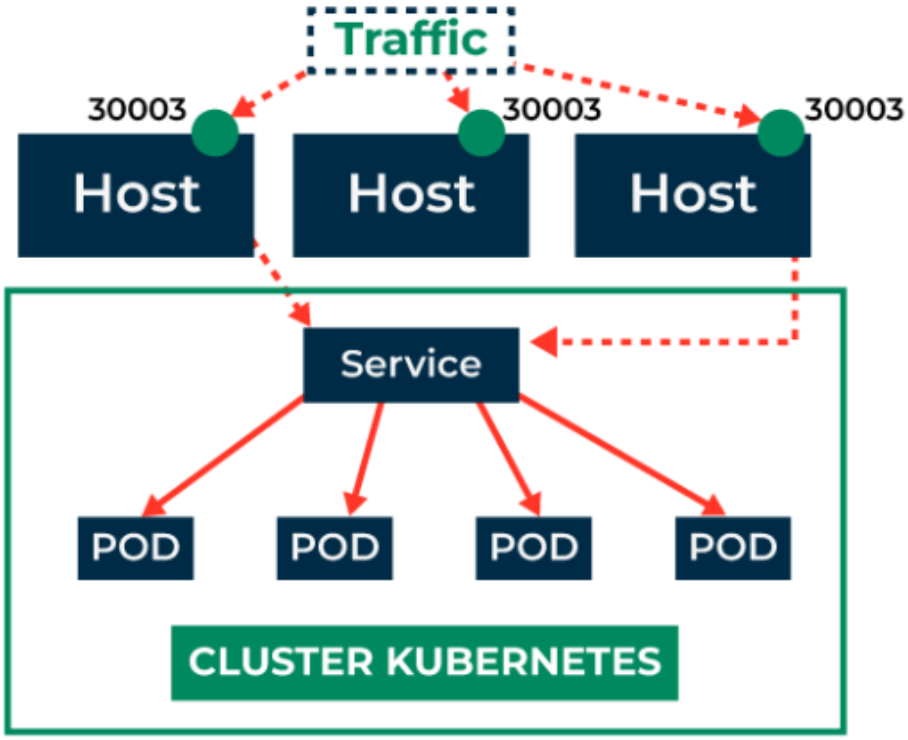
Kubernetes Services

Service

Mainly we 3 types of services.

1. **NodePort**
2. **ClusterIP**
3. **LoadBalancer**

1. NodePort



Let's create a service

vim service.yaml

```
apiVersion: v1
kind: Service
metadata:
 name: mysvc
spec:
 selector:
  app: webserver
 type: NodePort
 ports:
  - targetPort: 80
    port: 80
    nodePort: 30080
```

kubectl create -f service.yaml

```
root@master-node:~# vim service.yaml
root@master-node:~# kubectl create -f service.yaml
service/mysvc created
root@master-node:~#
root@master-node:~# kubectl get service
NAME         TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
kubernetes   ClusterIP   10.96.0.1       <none>        443/TCP        10d
mysvc        NodePort    10.100.161.39   <none>        80:30080/TCP   17s
root@master-node:~#
```

kubectl describe svc mysvc

```
root@master-node:~# kubectl describe svc mysvc
Name:                     mysvc
Namespace:                default
Labels:                   <none>
Annotations:              <none>
Selector:                 app=webserver
Type:                     NodePort
IP Family Policy:         SingleStack
IP Families:              IPv4
IP:                       10.100.161.39
IPs:                      10.100.161.39
Port:                     <unset>  80/TCP
TargetPort:               80/TCP
NodePort:                 <unset>  30080/TCP
Endpoints:
Session Affinity:         None
External Traffic Policy:  Cluster
Events:                   <none>
```

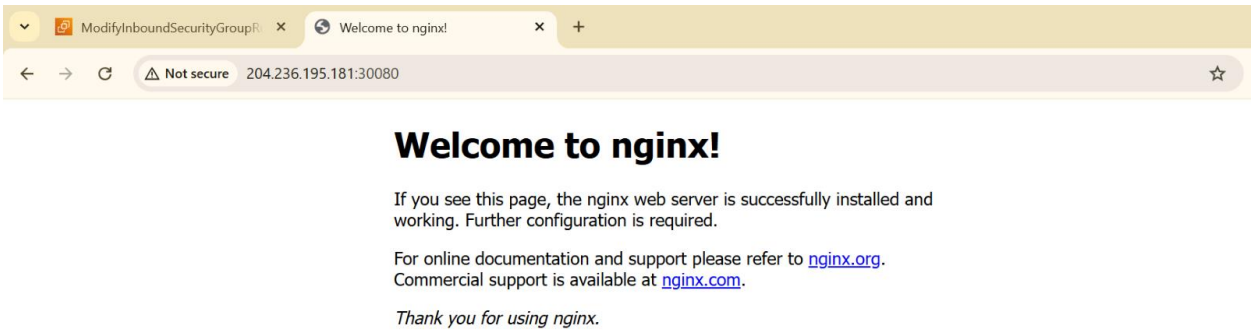
kubectl create -f deployment.yaml

```
root@master-node:~# kubectl create -f deployment.yaml
deployment.apps/mywebsite created
root@master-node:~#
root@master-node:~#
root@master-node:~# kubectl get deployments.apps
NAME        READY   UP-TO-DATE   AVAILABLE   AGE
mywebsite   50/50   50           50          29s
root@master-node:~#
```

Now access our application using worker node public ip and 30080 port

Go browser and access

http://worker-node-ip/30080



Ok now let's update image in deployment file and replace deployment with our custom image.

```
vim deployment.yaml
```

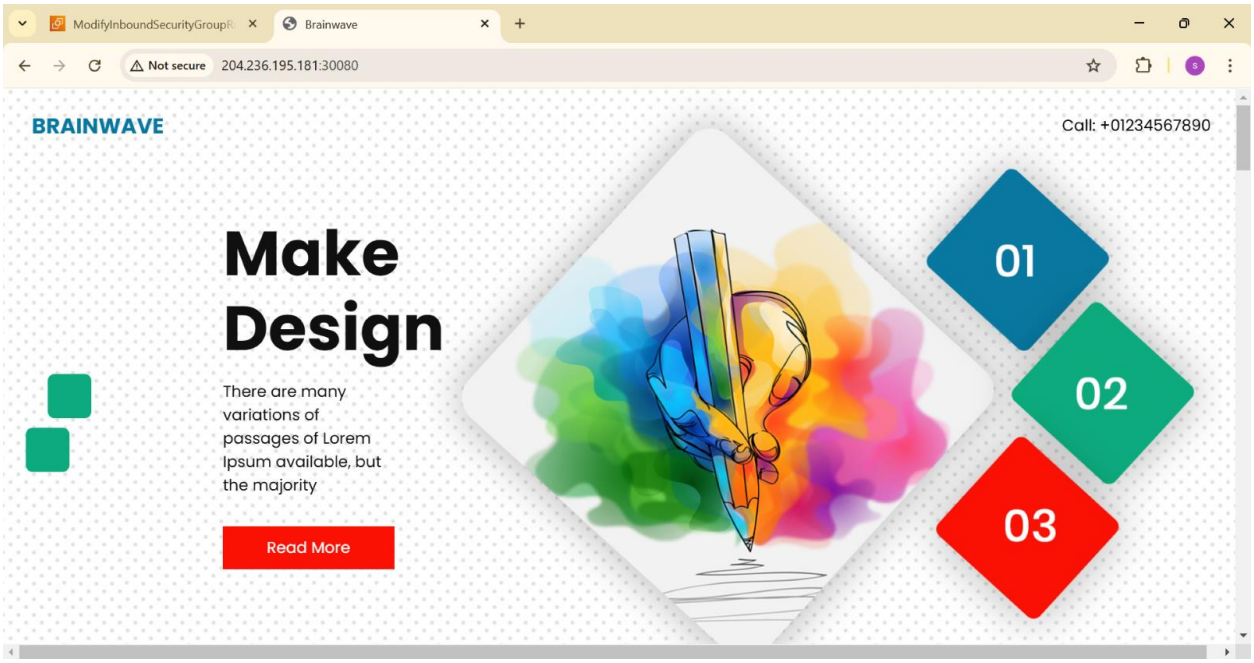
```yaml
kind: Deployment
metadata:
  name: mywebsite
spec:
  selector:
    matchLabels:
      app: webserver
  replicas: 50
  template:
    metadata:
      name: xyz
      labels:
        app: webserver
    spec:
      containers:
        - name: sdfdf
          image: jacksneel/centos-web
```

```
kubectl replace -f deployment.yaml
```

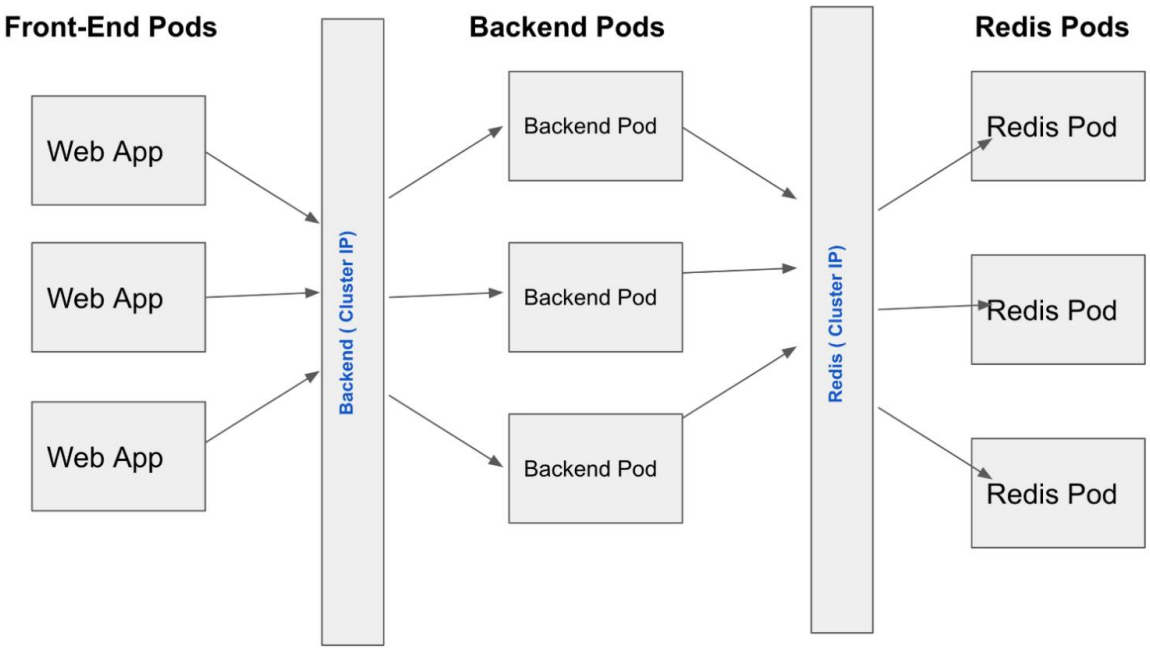
```
root@master-node:~# vim deployment.yaml
root@master-node:~# kubectl replace -f deployment.yaml
deployment.apps/mywebsite replaced
root@master-node:~#
root@master-node:~# kubectl get deployments.apps
NAME        READY   UP-TO-DATE   AVAILABLE   AGE
mywebsite   38/50   37           38          11m
root@master-node:~#
```

Let's access application

http://worker-node-ip/30080



2. ClusterIP



Lets create a ClusterIP service for exiting pods

```
vim cluster.yml
```

```
apiVersion: v1
kind: Service
metadata:
 name: myip
spec:
 selector:
   app: webserver
 type: ClusterIP
 ports:
  - targetPort: 80
    port: 80
```

```
kubectl create -f cluster.yml
```

```
root@master-node:~# kubectl get svc
NAME         TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
kubernetes   ClusterIP   10.96.0.1       <none>        443/TCP        10d
myip         ClusterIP   10.97.33.109    <none>        80/TCP         7s
mysvc        NodePort    10.100.161.39   <none>        80:30080/TCP   30m
root@master-node:~#
```

```
root@master-node:~#
root@master-node:~# curl 10.97.33.109
<!DOCTYPE html>
<html lang="en">

<head>
  <!-- Basic -->
  <meta charset="utf-8" />
  <meta http-equiv="X-UA-Compatible" content="IE=edge" />
  <!-- Mobile Metas -->
  <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-f
it=no" />
  <!-- Site Metas -->
```

3. LoadBalancer

Exposes the Service externally using an external load balancer. Kubernetes does not directly offer a load balancing component; you must provide one, or you can integrate your Kubernetes cluster with a cloud provider.

type: LoadBalancer

On cloud providers which support external load balancers, setting the `type` field to `LoadBalancer` provisions a load balancer for your Service. The actual creation of the load balancer happens asynchronously, and information about the provisioned balancer is published in the Service's `.status.loadBalancer` field. For example:

```yaml
apiVersion: v1
kind: Service
metadata:
  name: my-service
spec:
  selector:
```

```
    app.kubernetes.io/name: MyApp
  ports:
    - protocol: TCP
      port: 80
      targetPort: 9376
  clusterIP: 10.0.171.239
  type: LoadBalancer
status:
  loadBalancer:
    ingress:
    - ip: 192.0.2.127
```

Traffic from the external load balancer is directed at the backend Pods. The cloud provider decides how it is load balanced.

To implement a Service of type: LoadBalancer, Kubernetes typically starts off by making the changes that are equivalent to you requesting a Service of type: NodePort. The cloud-controller-manager component then configures the external load balancer to forward traffic to that assigned node port.

You can configure a load balanced Service to omit assigning a node port, provided that the cloud provider implementation supports this.

Some cloud providers allow you to specify the loadBalancerIP. In those cases, the load-balancer is created with the user-specified loadBalancerIP. If the loadBalancerIP field is not specified, the load balancer is set up with an ephemeral IP address. If you specify a loadBalancerIP but your cloud provider does not support the feature, the loadbalancerIP field that you set is ignored.

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Imperative and Declarative Approach in Kubernetes

Difference Between Imperative and Declarative Approach in Kubernetes

Imperative Approach (Command-Based)

Definition:
In the **imperative approach**, we **give direct commands** to Kubernetes to perform actions like creating or modifying resources using kubectl run, kubectl create, or kubectl expose.

Example:
If we want to create an **Nginx pod** using the imperative approach, we run:

```
kubectl run nginx --image=nginx --port=80
```

Or to expose a service:

```
kubectl expose pod nginx --port=80 --type=NodePort
```

- **Features of Imperative Approach:**

  - **Direct Commands:** Resources are created and modified using direct commands.
  - **Instant Execution:** The commands execute immediately.
  - **Less Maintainable:** Changes must be manually applied each time.

Declarative Approach (YAML-based)

Definition:
In the **declarative approach**, we **define the desired state** of Kubernetes resources in **YAML files**, and then apply them using kubectl apply. Kubernetes ensures that the system reaches and maintains this desired state.

Example:
If we want to deploy **Nginx using a Deployment**, we define the following **YAML file**:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
        - name: nginx
          image: nginx
          ports:
            - containerPort: 80
```

To apply this YAML file:

```
kubectl apply -f nginx-deployment.yaml
```

- **Features of Declarative Approach:**

- **State-Based Management:** We define the **desired state**, and Kubernetes automatically maintains it.
- **Version Control Friendly:** YAML files can be stored in **Git** for tracking changes.
- **Easier Maintenance:** It allows for automation and better management of the cluster.