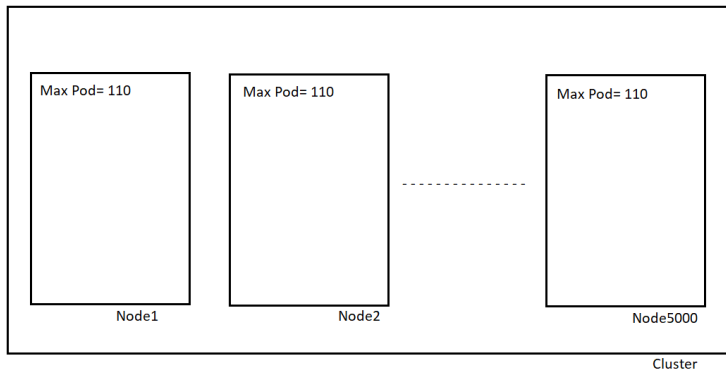


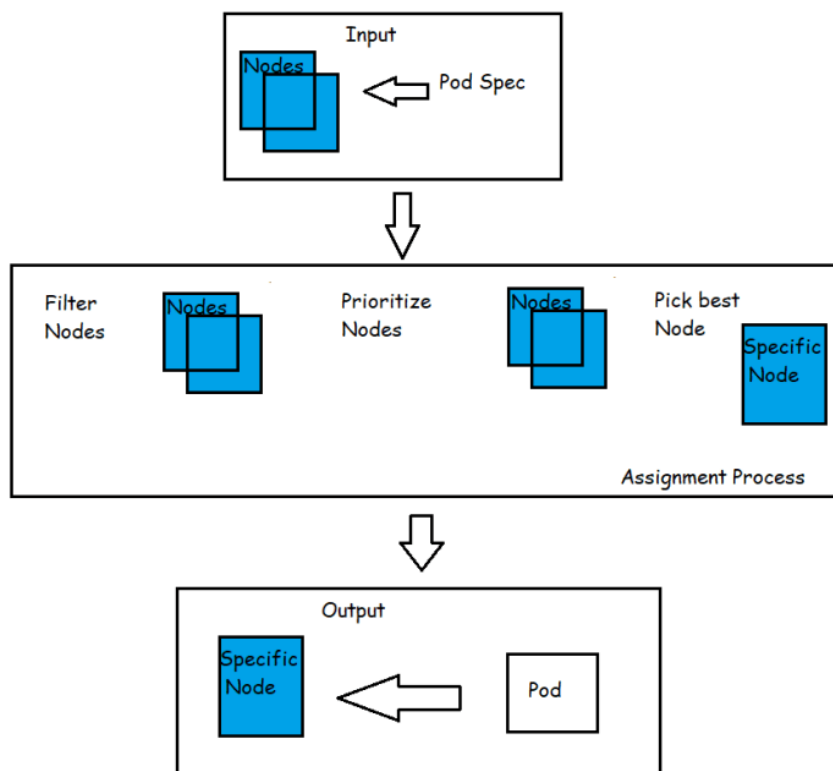
Considerations for large clusters

A cluster is a set of nodes (physical or virtual machines) running Kubernetes agents, managed by the control plane. Kubernetes v1.21 supports clusters with up to 5000 nodes. More specifically, Kubernetes is designed to accommodate configurations that meet *all* of the following criteria:

- No more than 110 pods per node
- No more than 5000 nodes
- No more than 150000 total pods
- No more than 300000 total containers



Scheduling Process (Automated Placement)



- As soon as pod is created that is not assigned to a node yet, it gets picked by scheduler together with all the available nodes and set of filtering and priority policies.

- In first stage, Scheduler tries to apply the filtering and priority policies by removing all the nodes that do not qualify the Pod's criteria
- In Second stage, all the qualified nodes get ordered by weight
- In last stage Pod gets assigned to the node (highest weight)
- Node Selector:
 - This assignment can be done under node selector
 - NodeSelector is the Pod field and specifies a map of key values pairs that must be present on the node for the node to be eligible to run the Pod

```
apiVersion: v1
kind: Pod
metadata:
  name: nginx
  labels:
    env: test
spec:
  containers:
  - name: nginx
    image: nginx
    imagePullPolicy: IfNotPresent
  nodeSelector:
    disktype: ssd
    os: ubuntu
```

Assign Pods to Nodes

kubectl get nodes --show-labels

NAME	STATUS	ROLES	AGE	VERSION	LABELS
worker0	Ready	<none>	1d	v1.13.0	...,kubernetes.io/host
worker1	Ready	<none>	1d	v1.13.0	...,kubernetes.io/host
worker2	Ready	<none>	1d	v1.13.0	...,kubernetes.io/host

kubectl label nodes <your-node-name> disktype=ssd

NAME	STATUS	ROLES	AGE	VERSION	LABELS
worker0	Ready	<none>	1d	v1.13.0	...,disktype=ssd,kuber
worker1	Ready	<none>	1d	v1.13.0	...,kubernetes.io/host
worker2	Ready	<none>	1d	v1.13.0	...,kubernetes.io/host

Node Affinity:

- This feature is generalization of the node selector approach.
- Node Affinity feature greatly expands the types of constraints that be expressed by providing operators
 - In
 - NotIn
 - Exists
 - DoesNotExist
 - Gt
 - Lt

```
apiVersion: v1
kind: Pod
metadata:
  name: nodeaffinity-demo
spec:
  affinity:
    nodeAffinity:
      requiredDuringSchedulingIgnoredDuringExecution:
        nodeSelectorTerms:
          - matchExpressions:
              - key: numberOfCores
                operator: Gt
                values: [ "2" ]
      preferredDuringSchedulingIgnoredDuringExecution:
        - weight: 1
          preference:
            matchFields:
              - key: 'diskType'
                operator: In
                values: ["ssd"]
  containers:
    - name: nodeaffinity-container
      image: nginx
      ports:
        - containerPort: 80
      livenessProbe:
        httpGet:
          port: 80
          path: /
        initialDelaySeconds: 30
```

