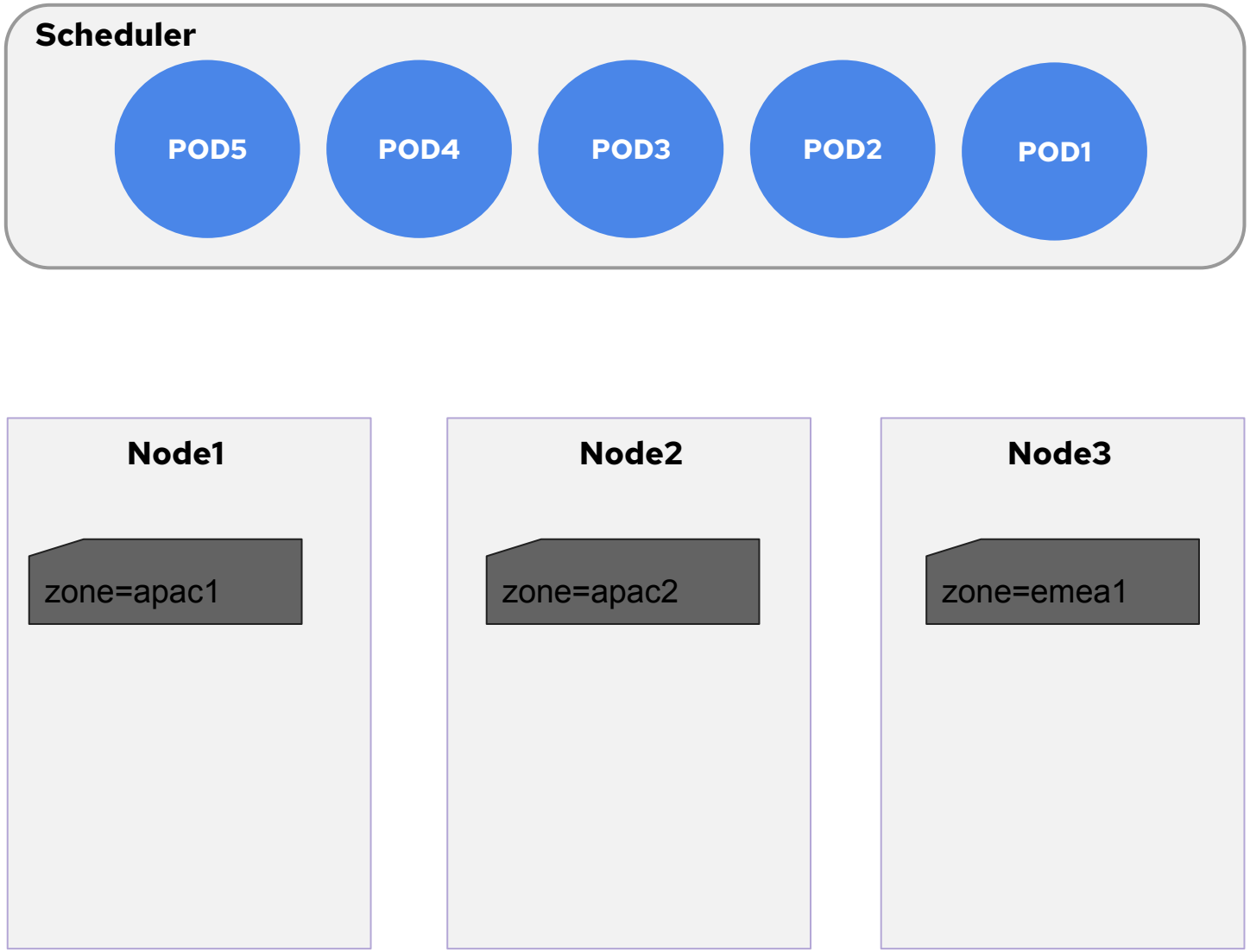
Scheduling

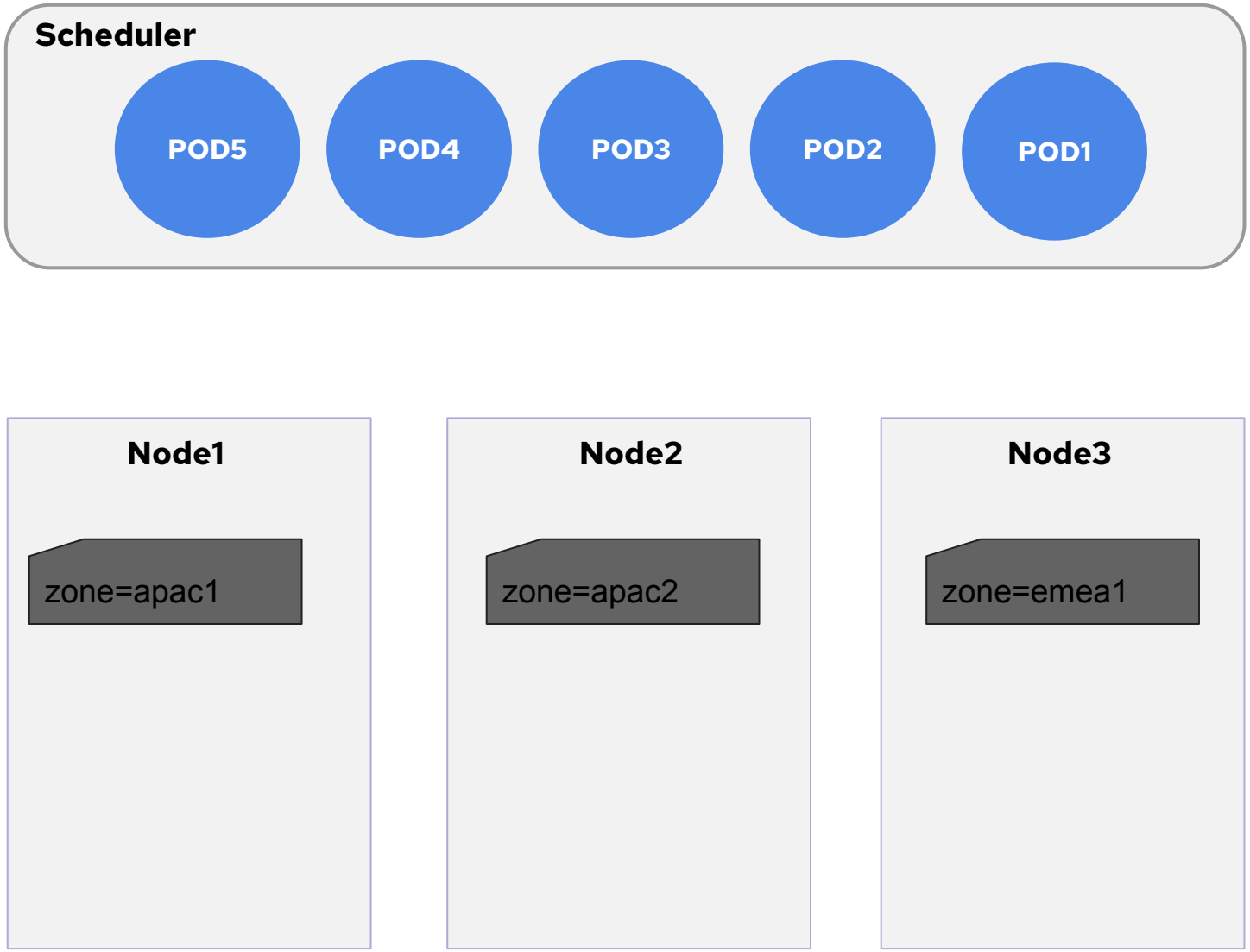
다양한 스케줄링 방법법

- **Pod Affinity and Anti-Affinity**
  - **Pod가 함께 배치될 수 있는 Pod에 대한 선호도(또는 반 선호도)**를 지정할 수 있게 해준다(애플리케이션의 지연 조건, 보안 등을 위해).
  - 노드는 배치를 제어할 수 없음.
  - 노드의 레이블과 파드의 레이블 Selector를 사용하여 Pod 배치를 위한 규칙을 생성한다. 규칙은 **필수(required) 또는 최선의 노력(Preferred)**가 있다.
- **Node Affinity**
  - **Pod가 배치될 수 있는 Node에 대한 선호도(또는 반 선호도)**(특별한 하드웨어, 위치, 고가용성 요구 사항 등으로 인해)를 지정할 수 있다.
  - 노드는 배치를 제어할 수 없음.
  - 노드의 레이블과 파드의 레이블 Selector를 사용하여 Pod 배치를 위한 규칙을 생성한다. 규칙은 **필수(required) 또는 최선의 노력(Preferred)**가 있다.
- **Node Selectors**
  - 노드 셀렉터는 **노드의 레이블**과 **파드의 레이블 셀렉터**를 사용하여 **Pod가 배치될 수 있는 노드를 제어**할 수 있도록 한다.
  - 노드 선호도와 같은 **필수 및 선호 규칙이 없다.**
- **Taints and Tolerations**
  - 노드에서 어떤 파드를 스케줄링해야 하는지(또는 스케줄링하지 않아야 하는지) 제어할 수 있다. 테인트는 노드의 레이블이고 톨러레이션은 파드의 레이블이다. 파드의 레이블은 노드의 레이블(테인트)과 일치(또는 허용)해야 스케줄링될 수 있다.
  - Affinity에 비해 한 가지 장점이 있다. 예를 들어, 클러스터에 레이블이 다른 새 노드 그룹을 추가하는 경우, 노드에 액세스하려는 각 파드와 새 노드를 사용하지 않으려는 다른 모든 파드의 선호도를 업데이트해야 합니다. 틴트/톨러레이션을 사용하면 다른 파드가 튕겨져 나가기 때문에 새 노드에 랜딩하는 데 필요한 파드만 업데이트하면 됩니다.

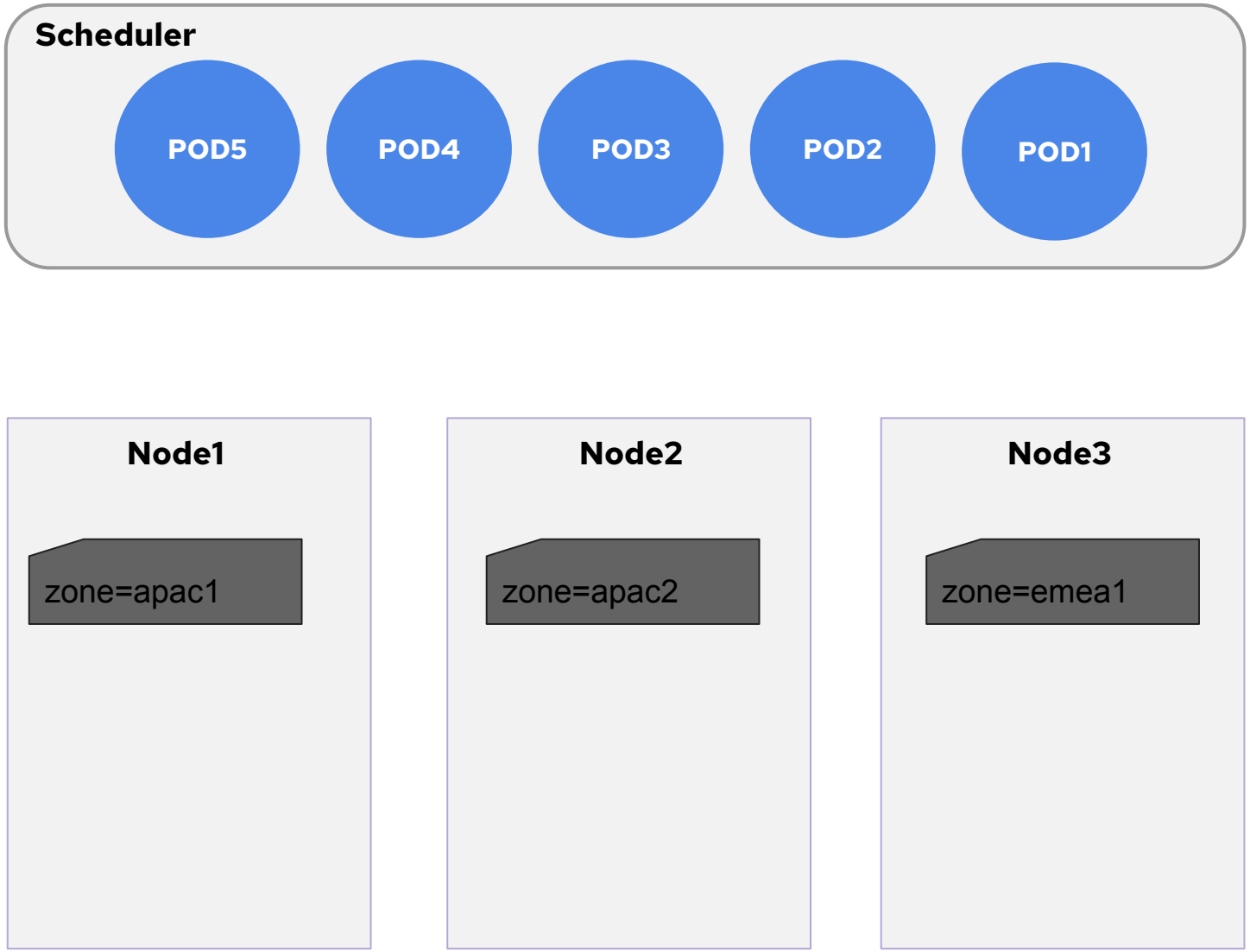
Node Selector



Node Selector

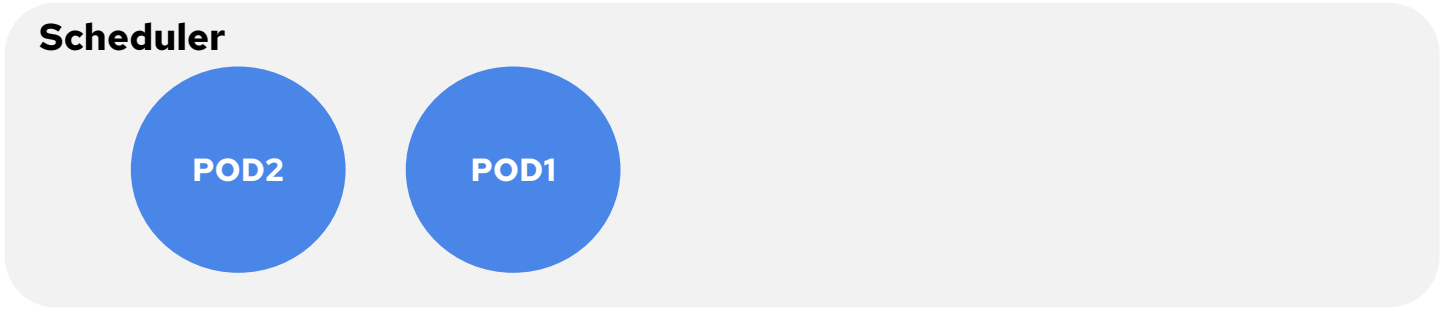


Node Affinity

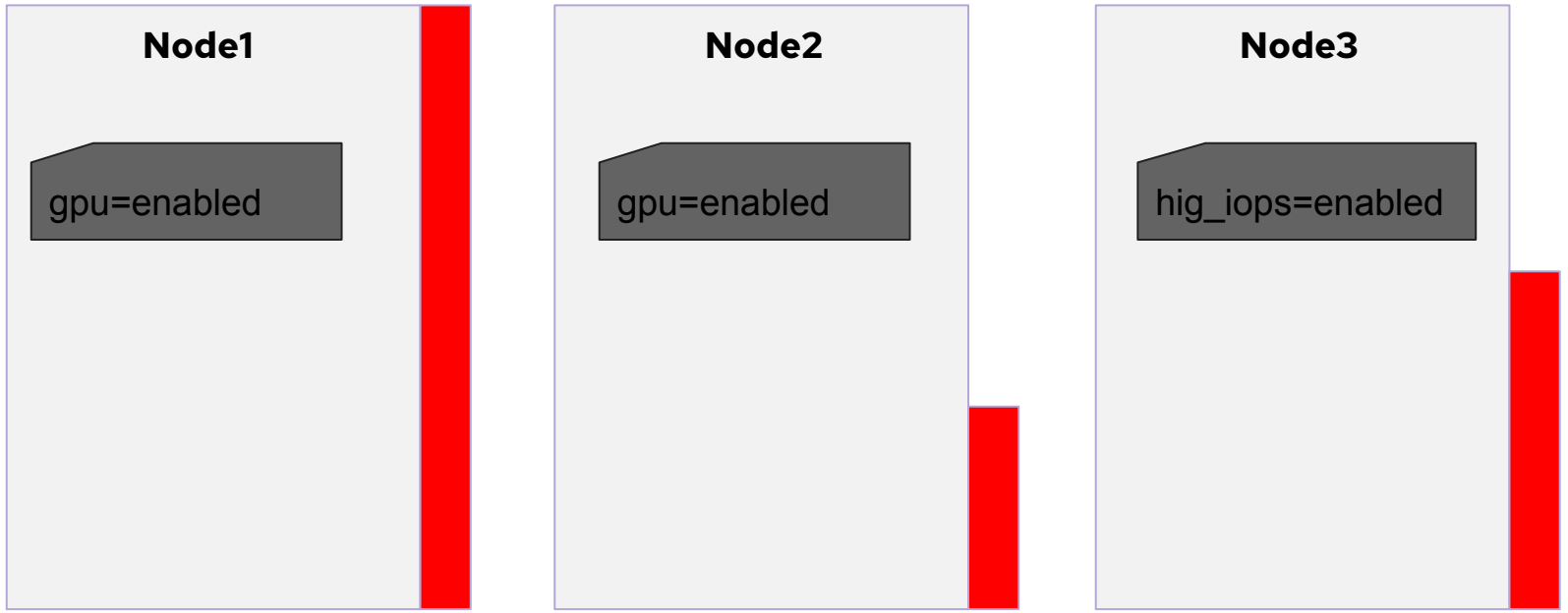


Node Affinity

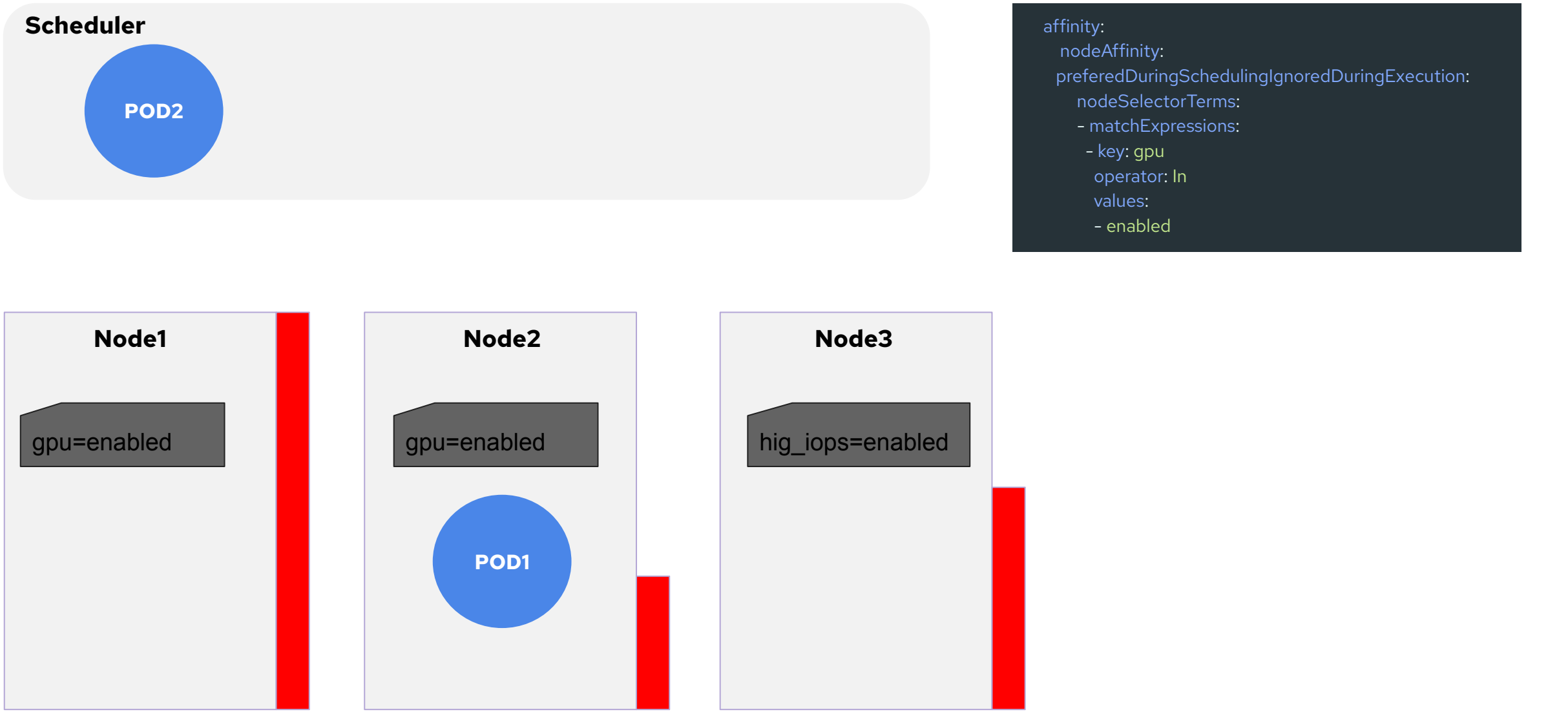
Node Affinity - preferred




```yaml
affinity:
  nodeAffinity:
    preferedDuringSchedulingIgnoredDuringExecution:
      nodeSelectorTerms:
      - matchExpressions:
        - key: gpu
          operator: In
          values:
          - enabled
```



Node Affinity - preferred

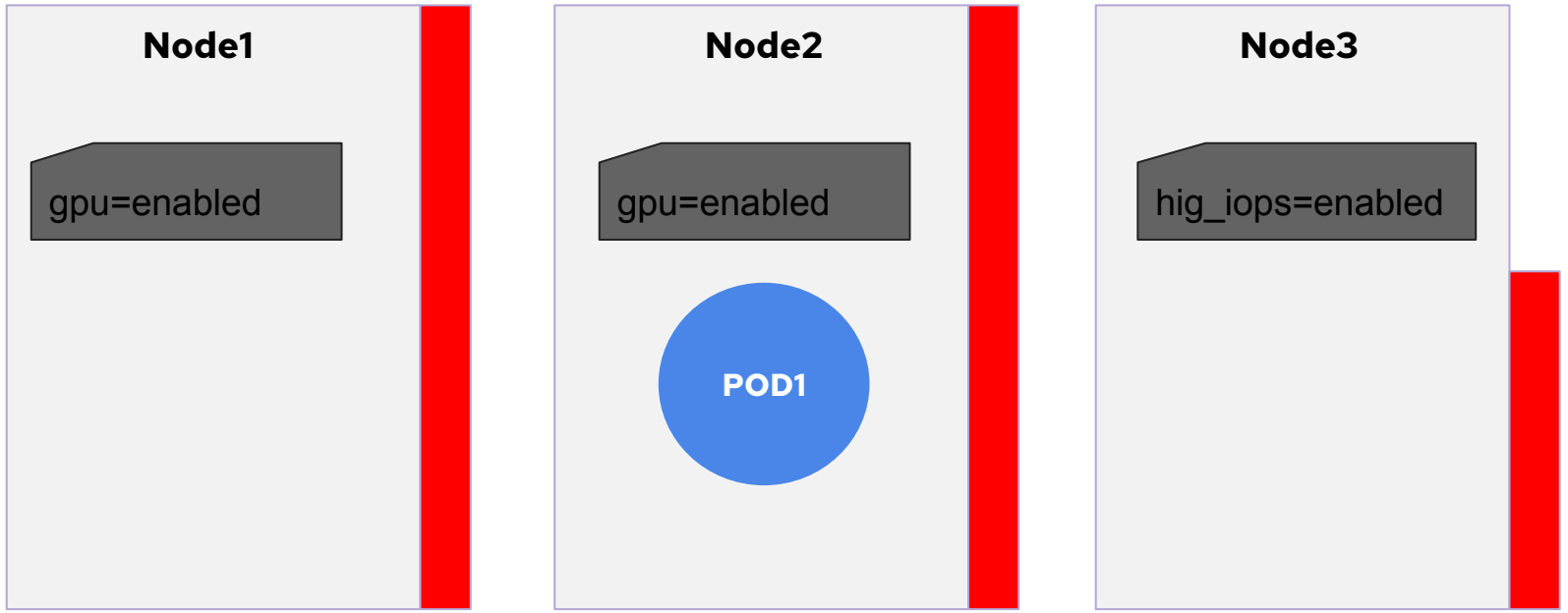


Node Affinity - preferred

Scheduler

POD2

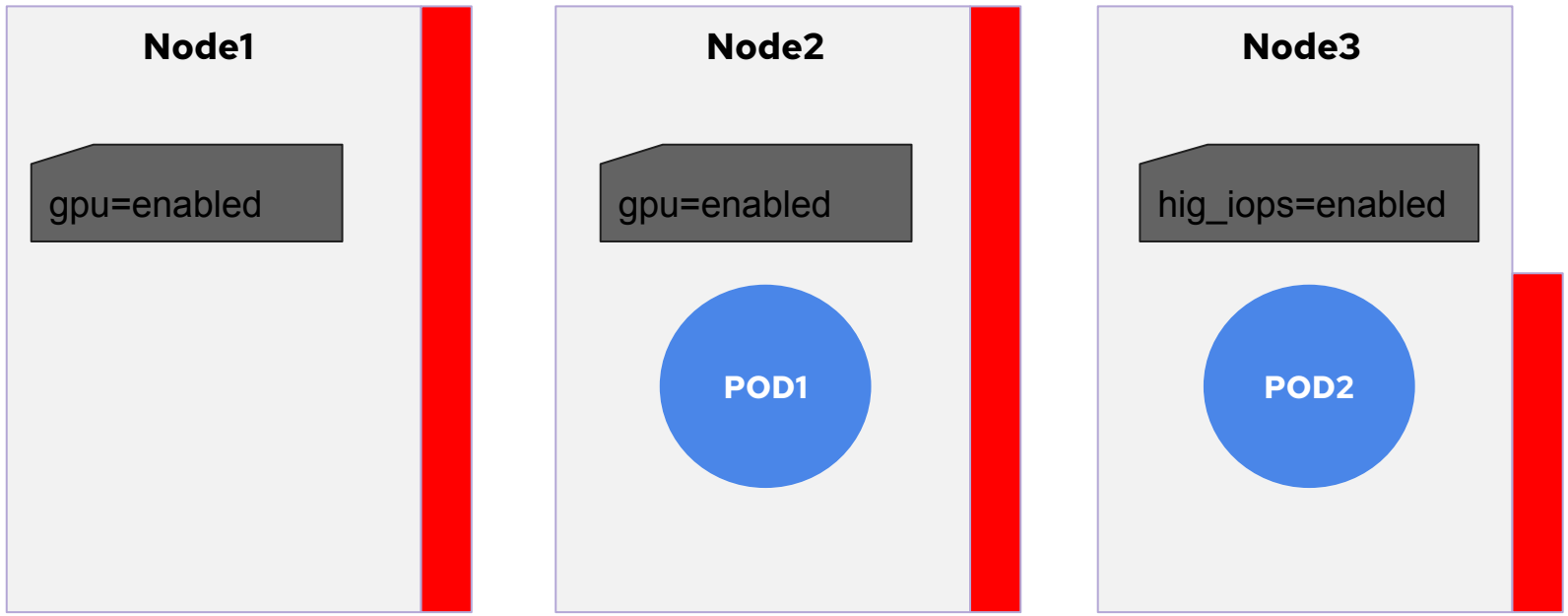
```
affinity:
  nodeAffinity:
    preferedDuringSchedulingIgnoredDuringExecution:
      nodeSelectorTerms:
      - matchExpressions:
        - key: gpu
          operator: In
          values:
          - enabled
```



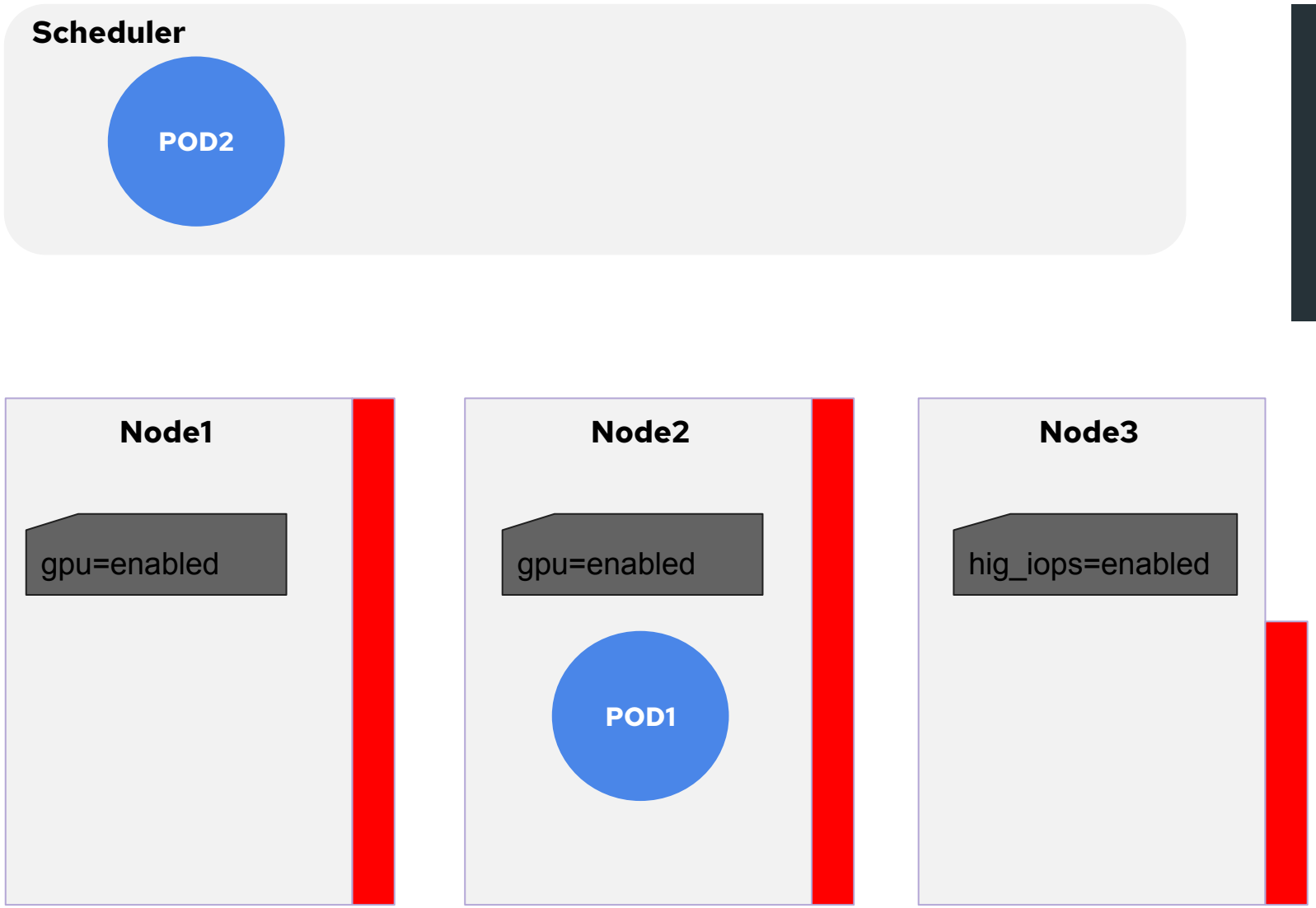
Node Affinity - preferred

Scheduler

```yaml
affinity:
  nodeAffinity:
    preferedDuringSchedulingIgnoredDuringExecution:
      nodeSelectorTerms:
      - matchExpressions:
        - key: gpu
          operator: In
          values:
          - enabled
```



Node Affinity - required



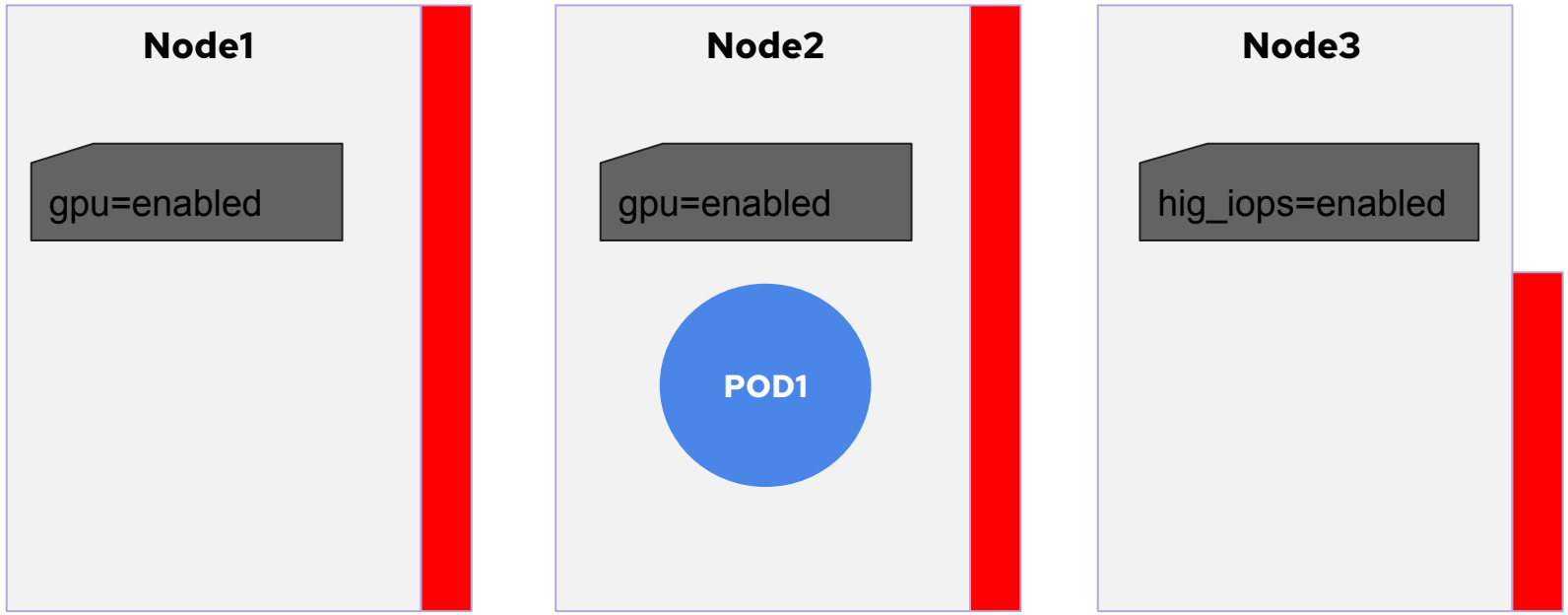

```yaml
affinity:
  nodeAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
      nodeSelectorTerms:
      - matchExpressions:
        - key: gpu
          operator: In
          values:
          - enabled
```

Node Affinity - required

Scheduler

POD2
(대기)

```yaml
affinity:
  nodeAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
      nodeSelectorTerms:
      - matchExpressions:
        - key: gpu
          operator: In
          values:
          - enabled
```

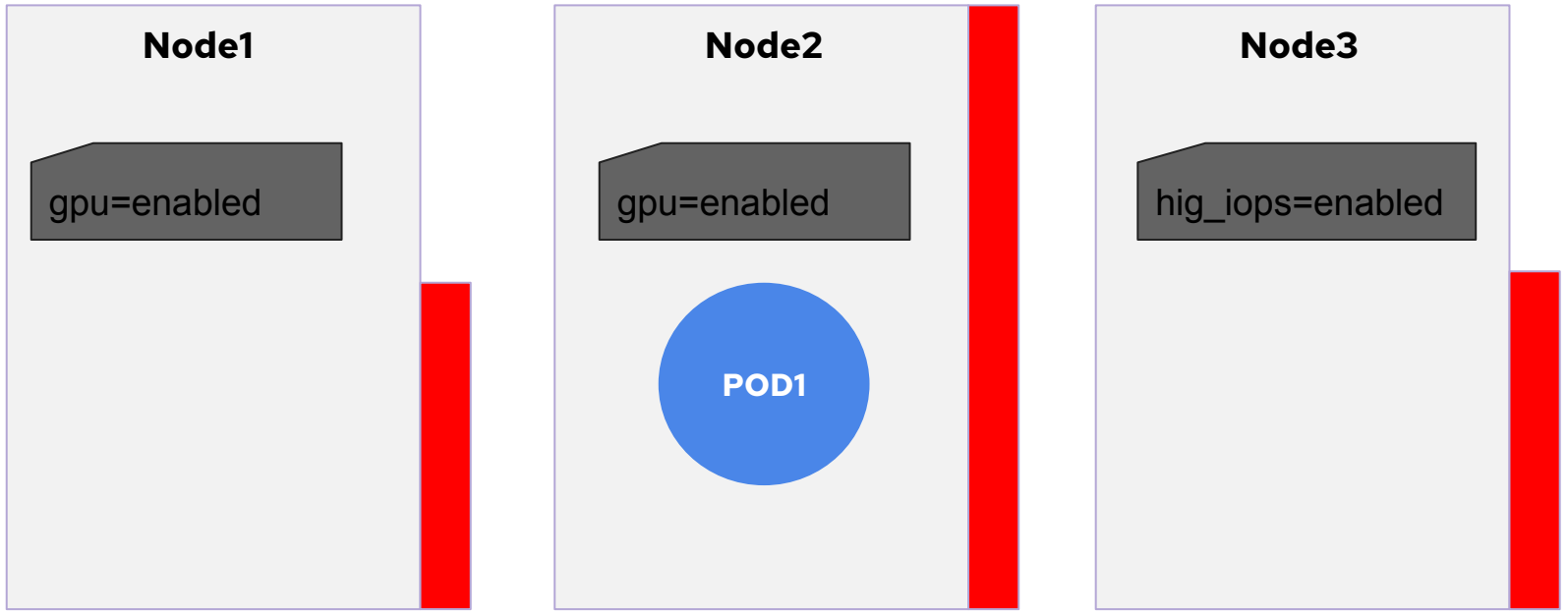


Node Affinity - required

Scheduler

POD2
(대기)

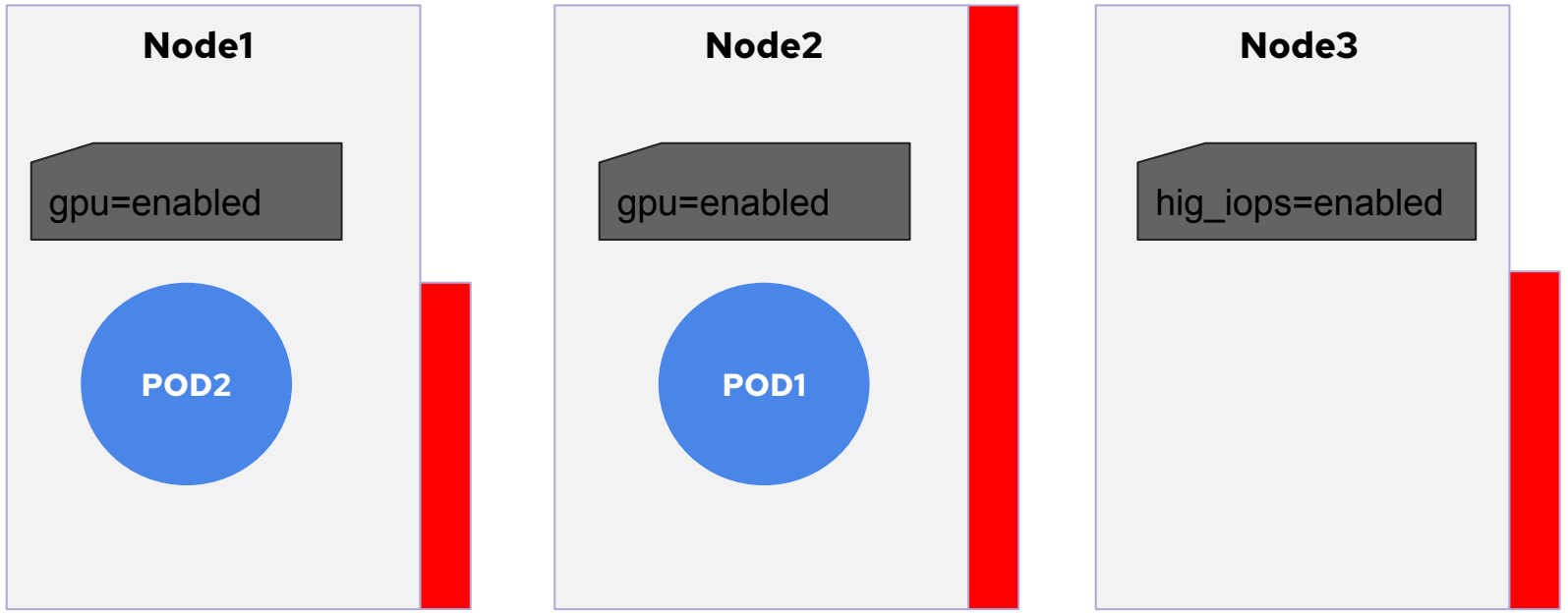
```yaml
affinity:
  nodeAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
      nodeSelectorTerms:
      - matchExpressions:
        - key: gpu
          operator: In
          values:
          - enabled
```



Node Affinity - required

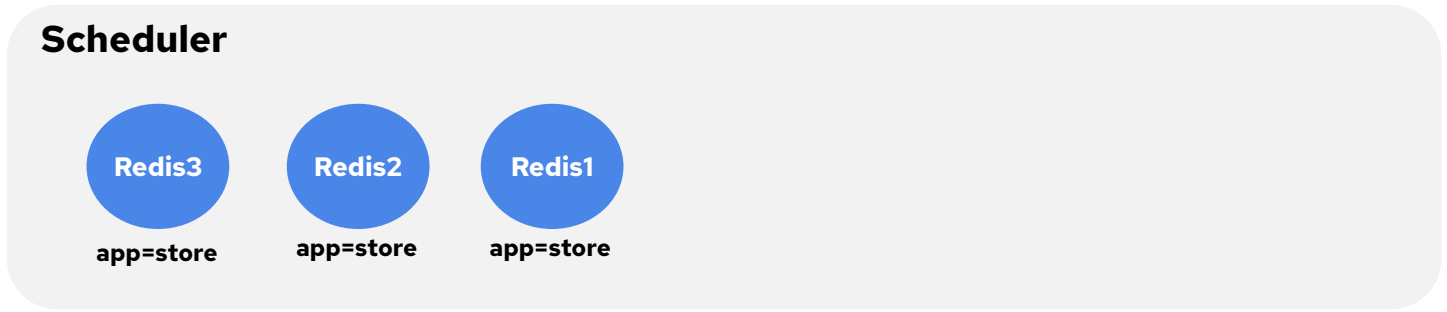
Scheduler

```yaml
affinity:
  nodeAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
      nodeSelectorTerms:
      - matchExpressions:
        - key: gpu
          operator: In
          values:
          - enabled
```

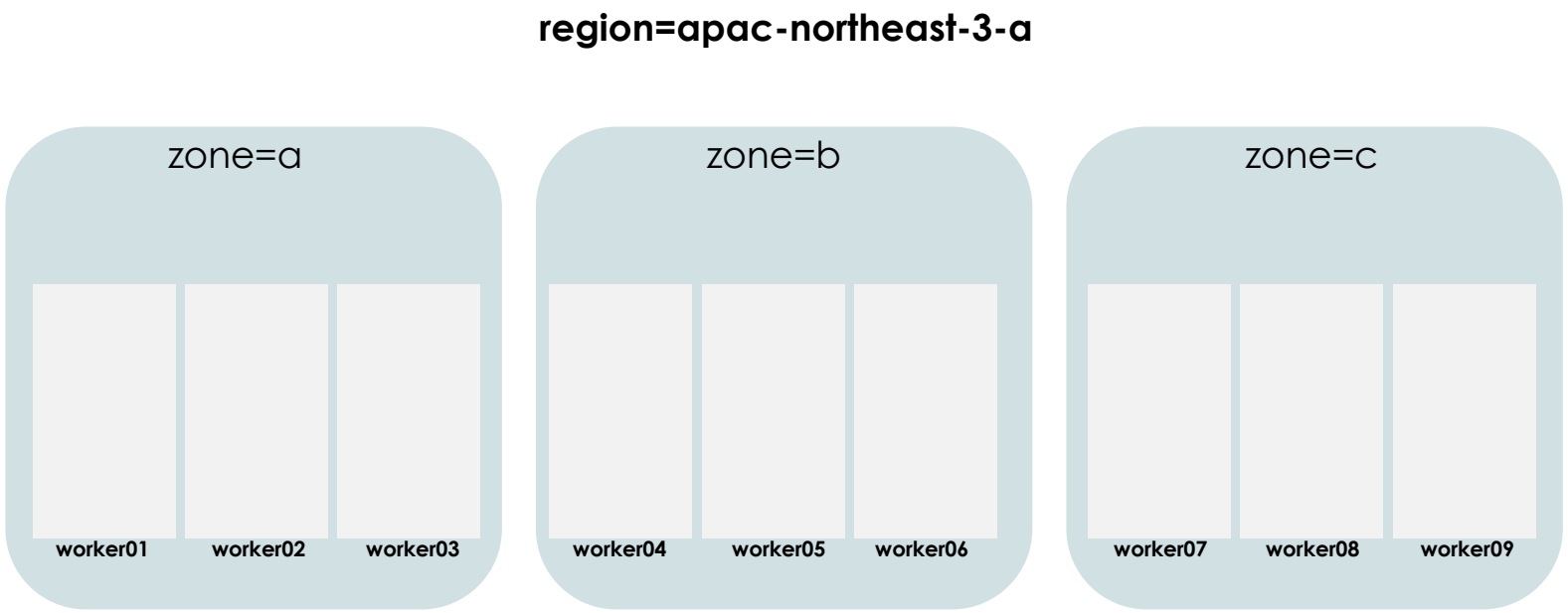


Inter Pod Affinity (Affinity & Anti-Affinity)

Inter Pod Affinity




```
affinity:
  podAntiAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector:
        matchExpressions:
          - { key: app,operator: In,values: [store] }
      topologyKey: "topology.kubernetes.io/region"
```



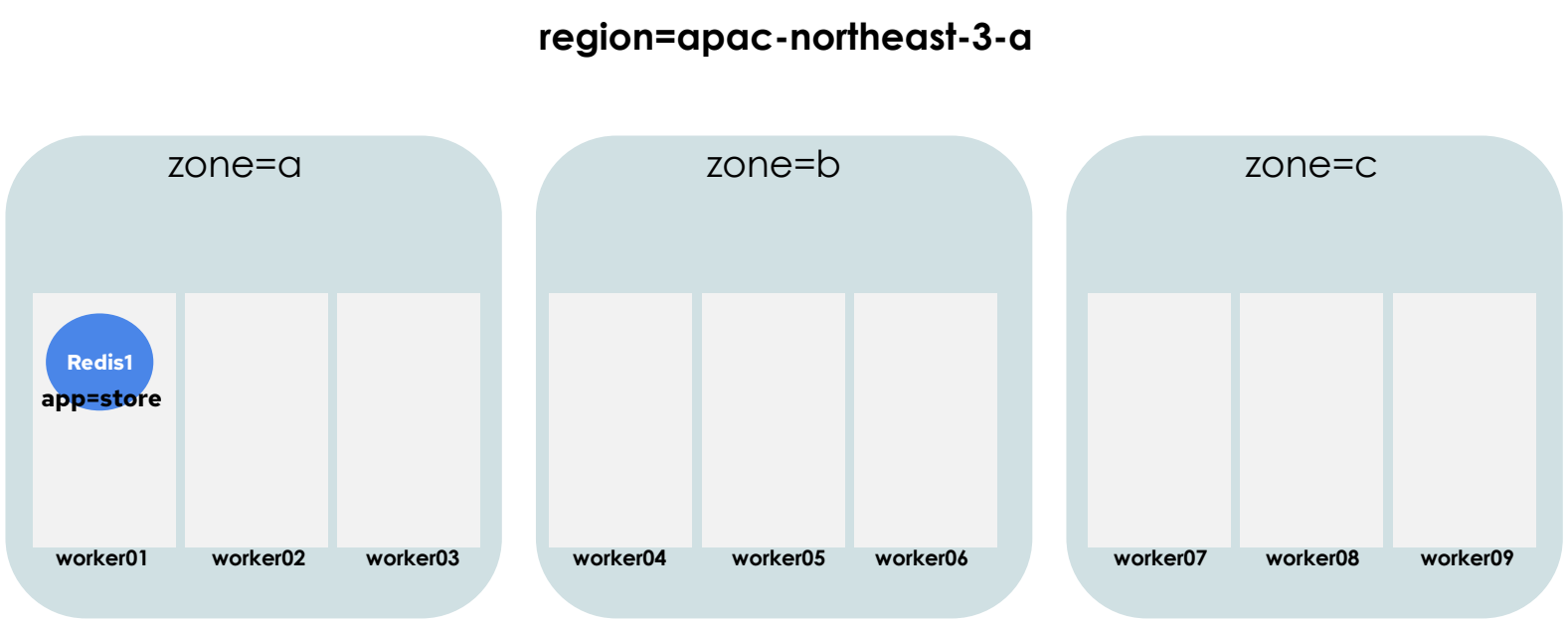
Inter Pod Affinity

Scheduler

Redis3
app=store

Redis2
app=store

```
affinity:
  podAntiAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector:
        matchExpressions:
          - { key: app,operator: In,values: [store] }
      topologyKey: "topology.kubernetes.io/region"
```



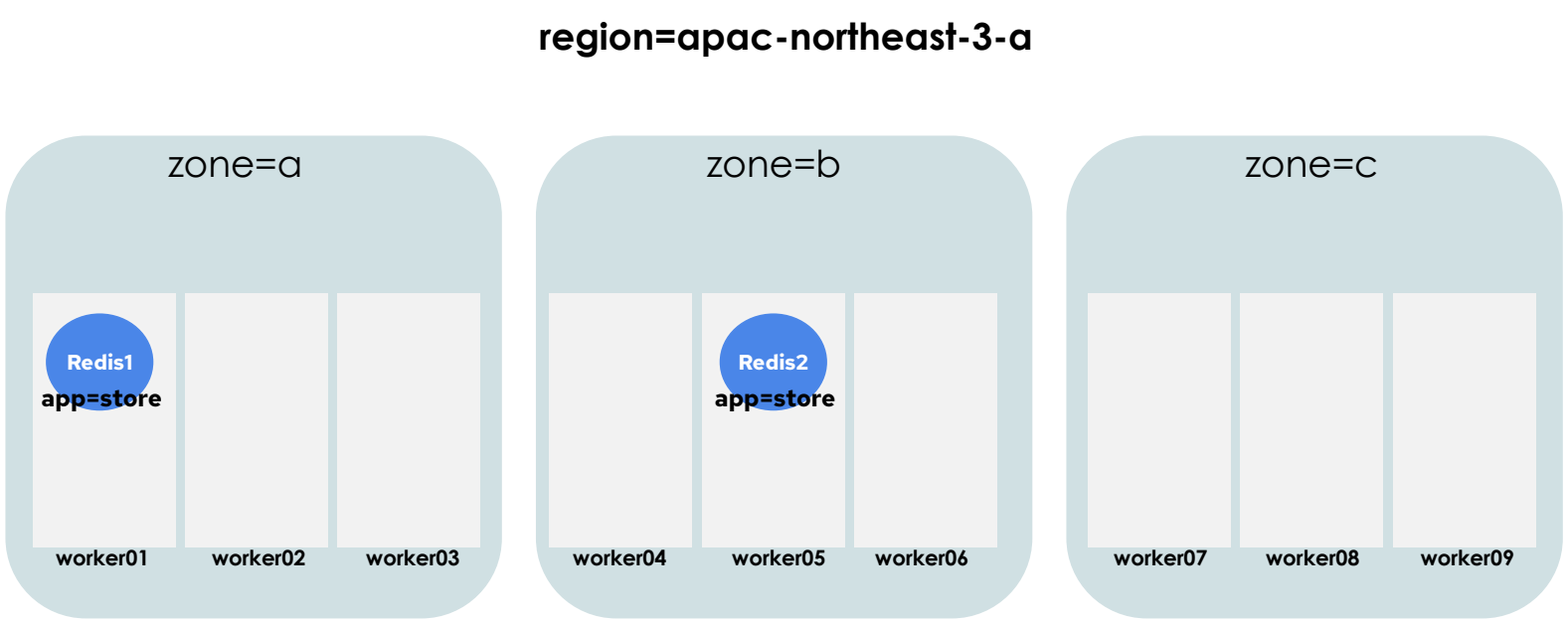
Inter Pod Affinity

Scheduler

Redis3

app=store

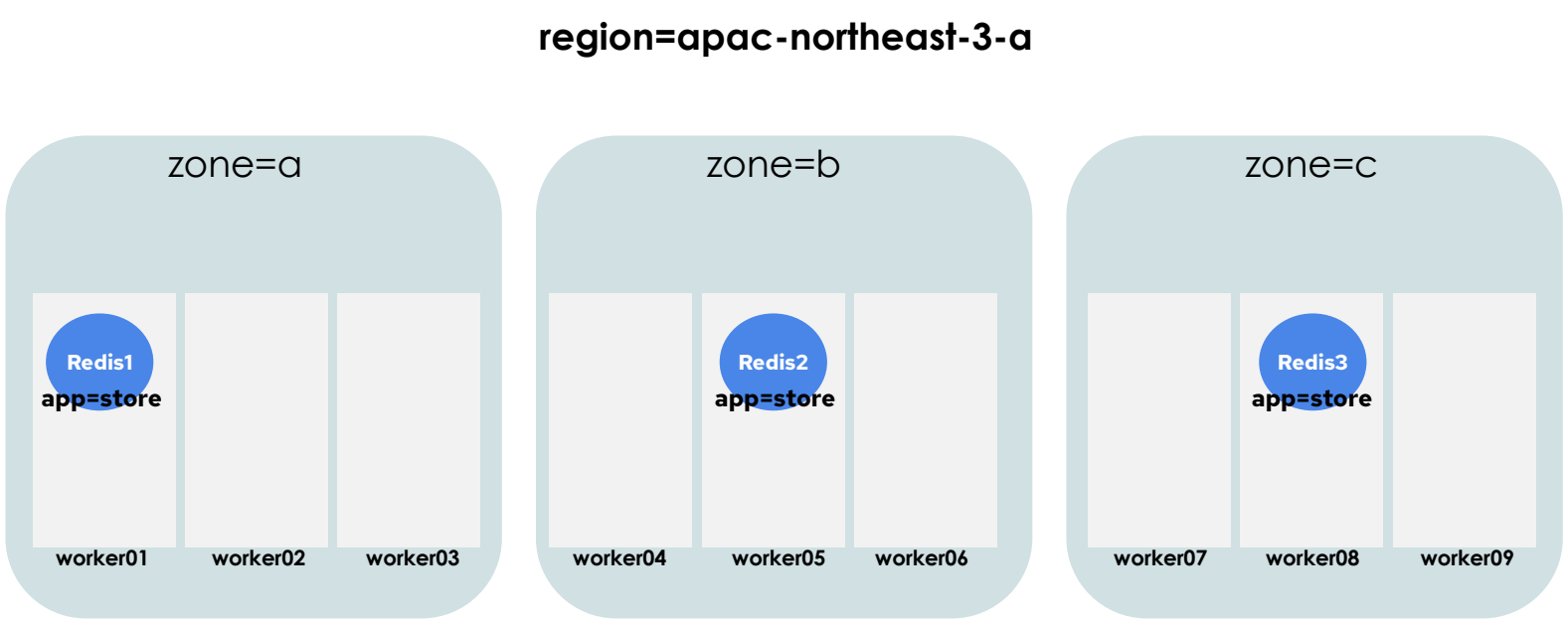
```
affinity:
  podAntiAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector:
        matchExpressions:
          - { key: app,operator: In,values: [store] }
      topologyKey: "topology.kubernetes.io/region"
```



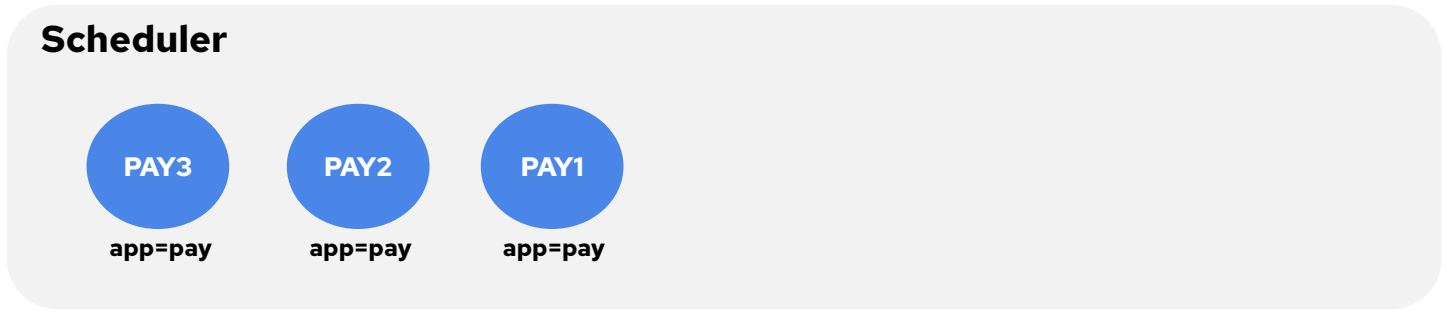
Inter Pod Affinity

Scheduler

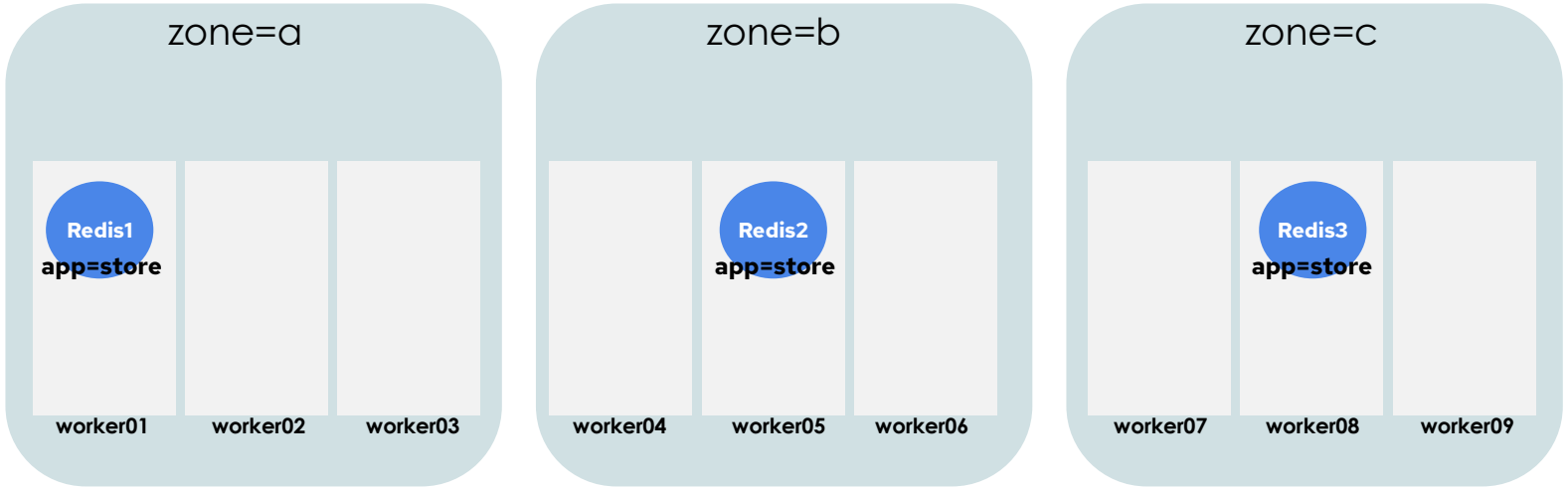
```
affinity:
  podAntiAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector:
        matchExpressions:
          - { key: app,operator: In,values: [store] }
      topologyKey: "topology.kubernetes.io/region"
```



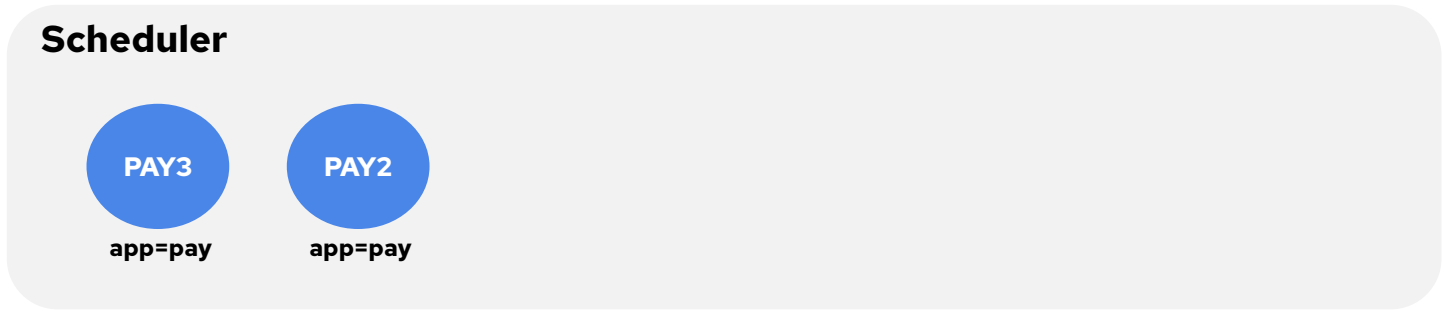
Inter Pod Affinity



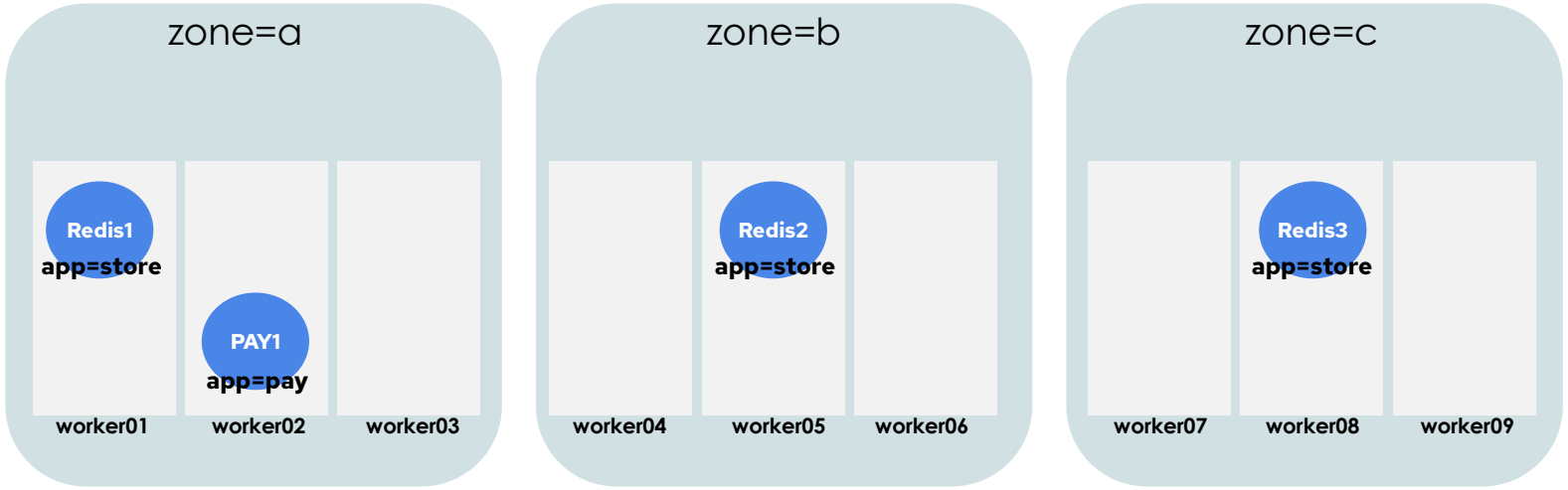

```yaml
affinity:
  podAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector: # 1.24 부터 namespaceSelector 사용가능
      matchExpressions:
      - { key: app,operator: In,values: [store] }
      topologyKey: topology.kubernetes.io/region
  podAntiAffinity:
    preferredDuringSchedulingIgnoredDuringExecution:
      podAffinityTerm:
        labelSelector:
          matchExpressions:
          - { key: app,operator: In,values: [pay] }
        topologyKey: topology.kubernetes.io/region
```



Inter Pod Affinity




```yaml
affinity:
  podAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector: # 1.24 부터 namespaceSelector 사용가능
      matchExpressions:
      - { key: app,operator: In,values: [store] }
      topologyKey: topology.kubernetes.io/region
  podAntiAffinity:
    preferredDuringSchedulingIgnoredDuringExecution:
      podAffinityTerm:
        labelSelector:
          matchExpressions:
          - { key: app,operator: In,values: [pay] }
        topologyKey: topology.kubernetes.io/region
```



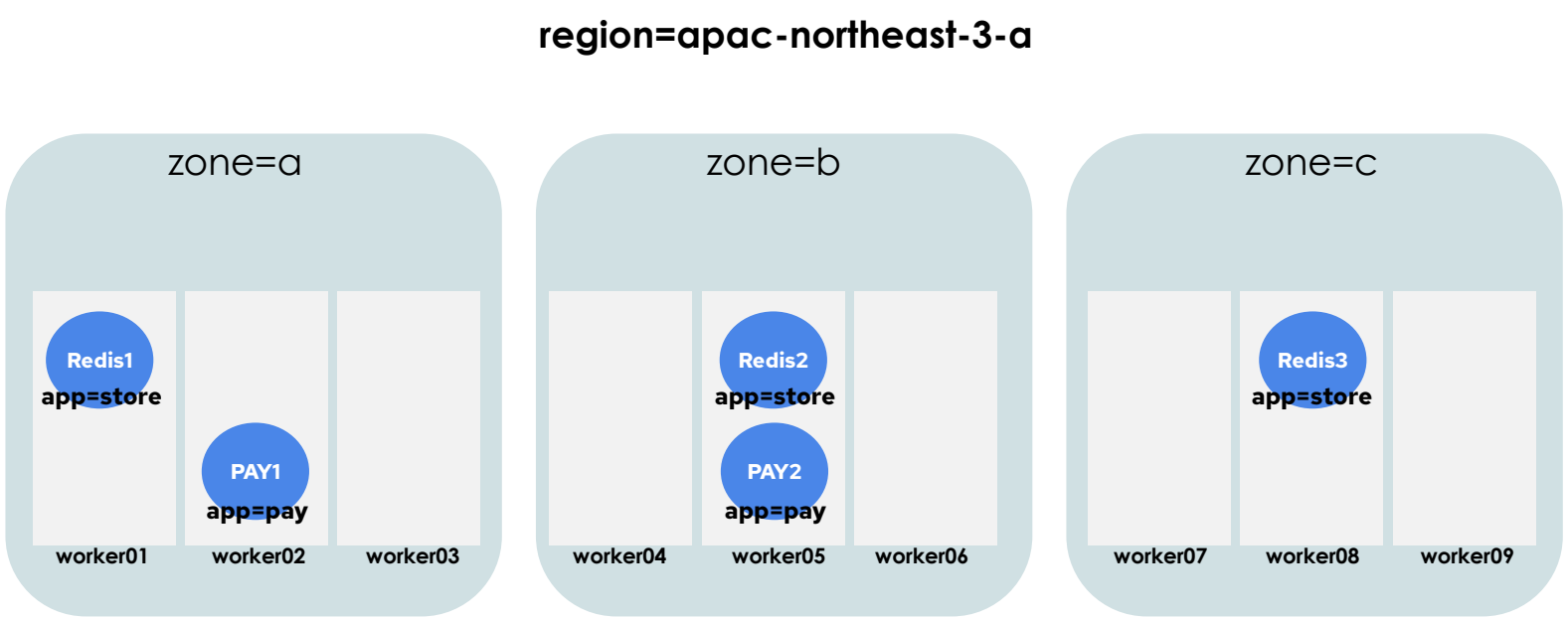
Inter Pod Affinity

Scheduler

PAY3

app=pay

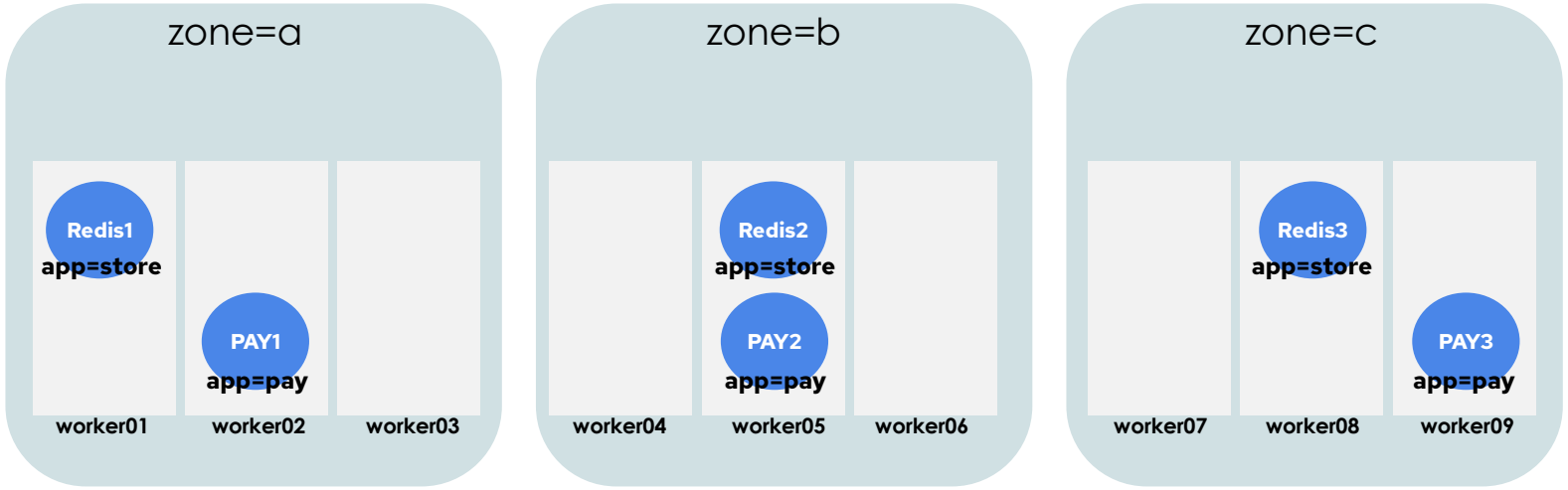
```
affinity:
  podAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector: # 1.24 부터 namespaceSelector 사용가능
      matchExpressions:
      - { key: app,operator: In,values: [store] }
      topologyKey: topology.kubernetes.io/region
  podAntiAffinity:
    preferredDuringSchedulingIgnoredDuringExecution:
      podAffinityTerm:
        labelSelector:
          matchExpressions:
          - { key: app,operator: In,values: [pay] }
        topologyKey: topology.kubernetes.io/region
```



Inter Pod Affinity

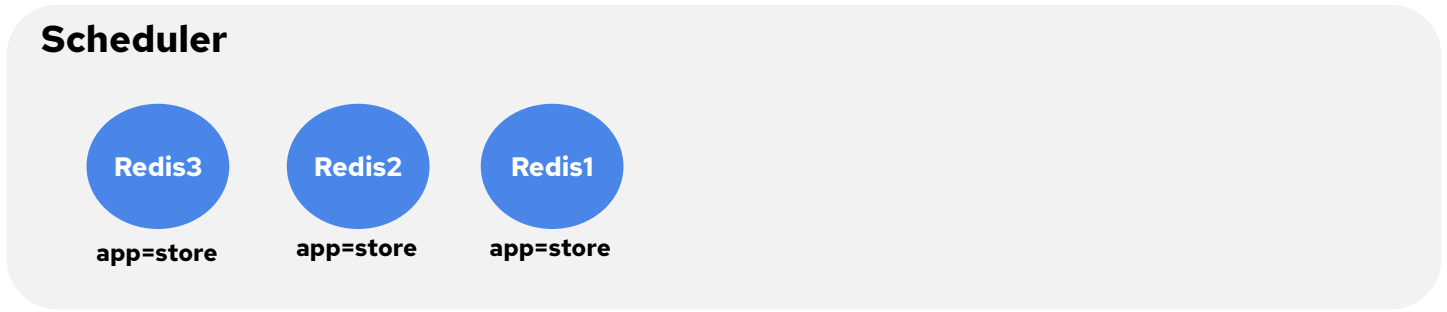
Scheduler

```
affinity:
  podAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector: # 1.24 부터 namespaceSelector 사용가능
      matchExpressions:
      - { key: app,operator: In,values: [store] }
      topologyKey: topology.kubernetes.io/region
  podAntiAffinity:
    preferredDuringSchedulingIgnoredDuringExecution:
      podAffinityTerm:
        labelSelector:
          matchExpressions:
          - { key: app,operator: In,values: [pay] }
        topologyKey: topology.kubernetes.io/region
```



Inter Pod Affinity with Weight

Inter Pod Affinity




```
affinity:
  podAntiAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
    - labelSelector:
        matchExpressions:
          - { key: app,operator: In,values: [store] }
      topologyKey: "topology.kubernetes.io/region"
```