

# Efficient Kubernetes Management with cdk8s:

A New Era of Infrastructure as Code

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## Problem statement

### Why Kubernetes

  
Open-source container management platform governed by the community



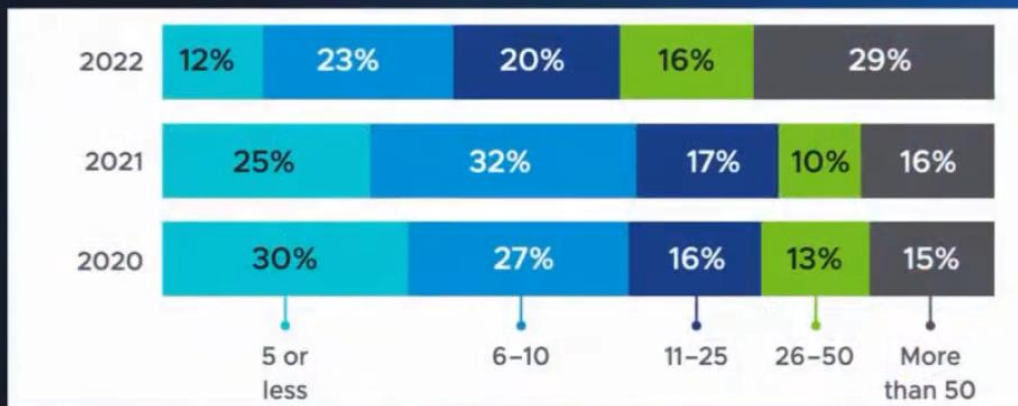
Run containers at scale, integrating networking, storage, and compute



Take advantage of open-source tools that are designed to run on Kubernetes



## Number of Kubernetes clusters currently in operation



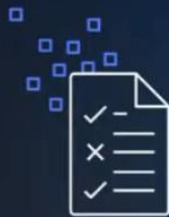
• The State of Kubernetes 2022 (VMware Tanzu)

# Kubernetes Manifests

- Easy for human
- Universal
- Declarative – desired state
- Static

# YAML

## What is YAML?



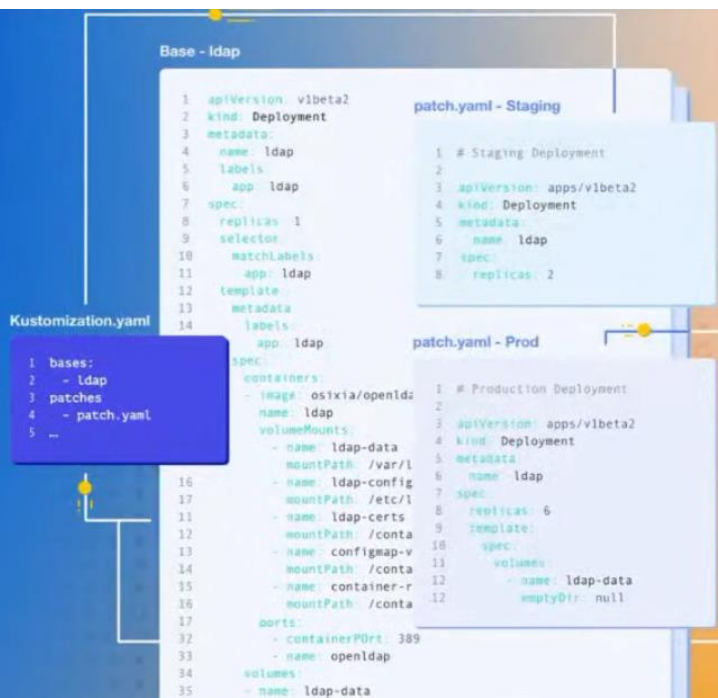
Easy when you have a few **things**

- Gets harder as you grow!
- Promotes copying and pasting
- Customizations are manual or require special tooling
- Updates are complex

aws

## Kustomize

- Purely declarative approach to configuration customization
- Every artifact that kustomize uses is plain **YAML** and can be validated and processed as such
- Natively built into kubectl



aws

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# HELM

- The package manager for Kubernetes
- Helm charts are written in **YAML**
- Helm template language - **Go** templates



## cdk8s

## CDK For Kubernetes (CDK8s)

An open-source multi-language software development framework for modeling Kubernetes resources as reusable components



### Go from code to config

Define Kubernetes applications and architectures using familiar programming languages



### Cut copy & paste

Turn best practices into code libraries and share easily

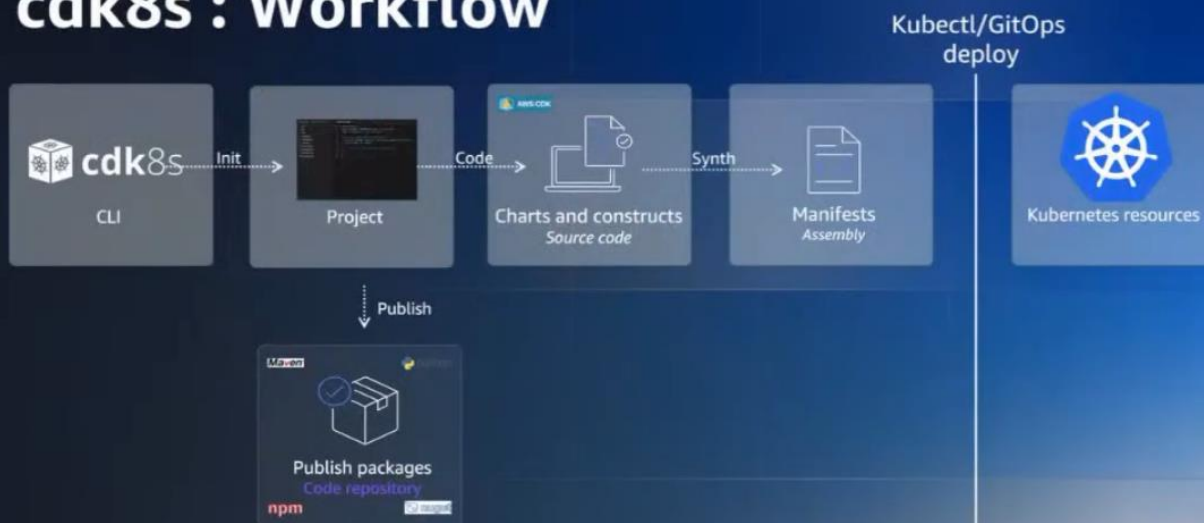


### Run everywhere

CDK8s runs locally and generates YAML you can deploy to any cluster, anywhere



## cdk8s : Workflow



NuGet logo by [NuGet.org](https://www.nuget.org/) / CC-BY 2.0

# cdk8s: In a nutshell

```
new k8s.KubeDeployment(this, 'Nginx', {
  metadata: {
    name: 'nginx'
  },
  spec: {
    template: {
      metadata: {
        labels: { app: 'nginx' }
      },
      spec: {
        containers: [{
          name: 'nginx-main',
          image: 'nginx'
        }]
      }
    },
    selector: {
      matchLabels: { app: 'nginx' }
    }
  }
});
```

cdk8s synth

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx
spec:
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
        - image: nginx
          name: nginx-main
```

# cdk8s-plus: API abstraction

```
new k8s.KubeDeployment(this, 'Nginx', {
  metadata: {
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```

# cdk8s-plus: API abstraction

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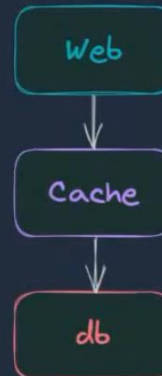
Intent

```
new kplus.Deployment(this, 'Nginx', {
  containers: [{ image: 'nginx' }]
});
```

# Develop web application

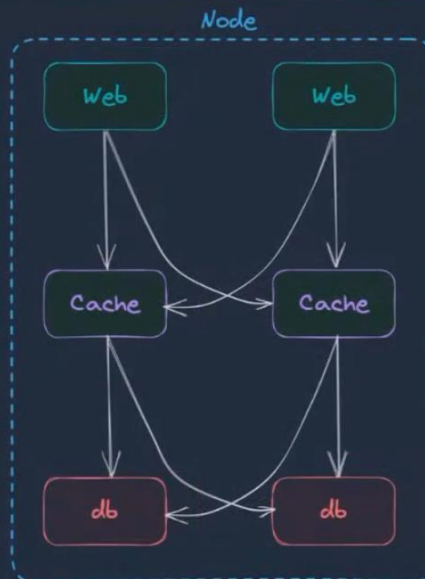
## Requirements

- 2 tier application Web -> Cache -> DB



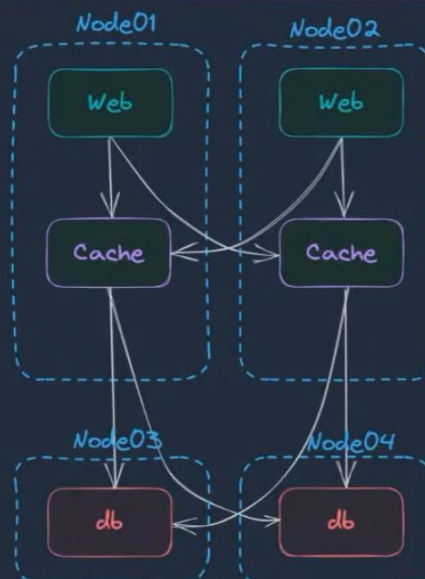
## Requirements

- 2 tier application Web -> Cache -> DB
- High availability



## Requirements

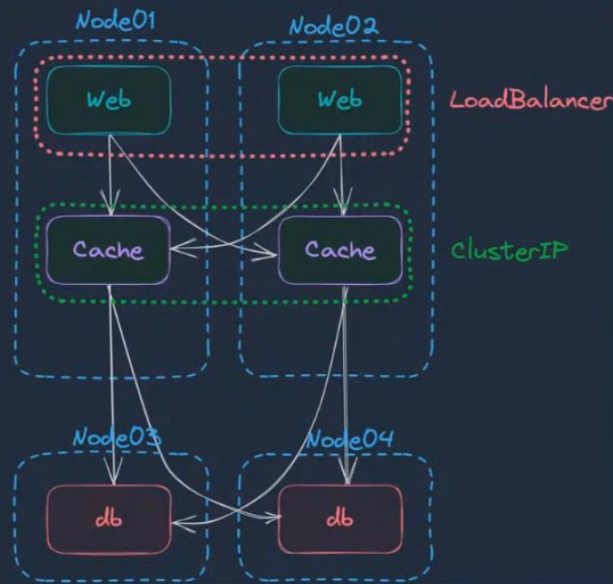
- 2 tier application Web -> Cache -> DB
- High availability
- Web and cache closer to each other.





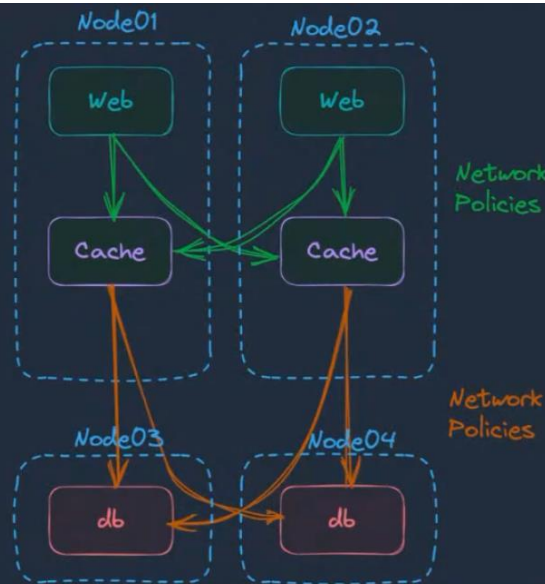
# Requirements

- 2 tier application Web -> Cache -> DB
- High availability
- Web and cache closer to each other
- Web service - public available
- Cache and db – internal access



# Requirements

- 2 tier application Web -> Cache -> DB
- High availability
- Web and cache closer to each other
- Web service - public available
- Cache and db – internal access
- Network Isolation:
  - Cache only allows web connections
  - db only allows cache connections



# Demo

The screenshot shows a code editor with the following code in `main.ts`:

```

1 import { Construct } from 'constructs';
2 import { App, Chart } from 'cdk8s';
3 import * as kplus from 'cdk8s-plus-27';
4
5 export class WebCacheDB extends Chart {
6   constructor(scope: Construct, id: string) {
7     super(scope, id);
8   }
9
10
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15
16 const app = new App();
17 new WebCacheDB(app, 'app01');
18 app.synth();

```

The Explorer panel on the left shows the project structure, including `dist`, `node_modules`, `.gitignore`, `cdk8s.yaml`, `main.d.ts`, `main.js`, `main.ts`, `package-lock.json`, `package.json`, and `tsconfig.json`.

```
demo-03-test

EXPLORER
  OPEN EDITORS
    TS main.ts 3
  DEMO-03-TEST
    dist
    node_modules
    .gitignore
    cdk8s.yaml
    main.d.ts
    main.js
    main.ts 3
    package-lock.json
    package.json
    tsconfig.json 1
  OUTLINE

TS main.ts 3 X
  TS main.ts > WebCacheDB > constructor
  1 import { Construct } from 'constructs';
  2 import { App, Chart } from 'cdk8s';
  3 import * as kplus from 'cdk8s-plus-27';
  4
  5 export class WebCacheDB extends Chart {
  6   constructor(scope: Construct, id: string) {
  7     super(scope, id);
  8
  9     const storageNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized', 'storage'));
 10     const memoryNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized', 'memory'));
 11
 12     const db = new kplus.StatefulSet(this, 'DB', {
 13       containers: [{
 14         image: 'db',
 15         portNumber: 9000
 16       }],
 17       replicas: 2,
 18       spread: true,
 19       isolate: true
 20     });
 21
 22
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 26   }
 27
 28   const app = new App();
 29   new WebCacheDB(app, 'app01');
 30   app.synth();
```

```
demo-03-test

main.ts 1 X
  main.ts > WebCacheDB > constructor
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 15         portNumber: 9000
 16       }],
 17       replicas: 2,
 18       spread: true,
 19       isolate: true
 20     });
 21     db.scheduling.attract(storageNodes);
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 26   }
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 29   new WebCacheDB(app, 'app01');
 30   app.synth();
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```

demo-03-test

TS main.ts 1 X

main.ts

WebCacheDB

constructor

```
1 import { Construct } from 'constructs';
2 import { App, Chart } from 'cdk8s';
3 import * as kplus from 'cdk8s-plus-27';
4
5 export class WebCacheDB extends Chart {
6   constructor(scope: Construct, id: string) {
7     super(scope, id);
8
9     const storageNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized')
10     const storageNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized')
11
12     const db = new kplus.StatefulSet(this, 'DB', {
13       containers: [{
14         image: 'db',
15         portNumber: 9000
16       }],
17       replicas: 2,
18       spread: true,
19       isolate: true
20     });
21     db.scheduling.attract(storageNodes);
22
23
24
25
26
27 }
28
29 const app = new App();
30 new WebCacheDB(app, 'app01');
31 app.synth();
```

3: AWS Builder ID ✓ CodeWhisperer

Ln 22, Col 5 Spaces: 2 UTF

apiVersion: apps/v1

kind: StatefulSet

metadata:

name: app01-db-c8ad66ec

spec:

minReadySeconds: 0

podManagementPolicy: OrderedReady

replicas: 2

selector:

serviceName: app01-db-service-c82d8efb

template:

metadata:

spec:

affinity:

nodeAffinity:

requiredDuringSchedulingIgnoredDuringExecution:

nodeSelectorTerms:

- matchExpressions:

- key: optimized

operator: In

values:

- storage

podAntiAffinity:

requiredDuringSchedulingIgnoredDuringExecution:

- labelSelector:

matchLabels:

cdk8s.io/metadata.addr: app01-DB-c8a73f76

topologyKey: kubernetes.io/hostname

- labelSelector:

matchLabels:

cdk8s.io/metadata.addr: app01-DB-c8a73f76

topologyKey: topology.kubernetes.io/zone

demo-03-test

TS main.ts 1 X

main.ts

WebCacheDB

constructor

```
1 import { Construct } from 'constructs';
2 import { App, Chart } from 'cdk8s';
3 import * as kplus from 'cdk8s-plus-27';
4
5 export class WebCacheDB extends Chart {
6   constructor(scope: Construct, id: string) {
7     super(scope, id);
8
9     const storageNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized')
10     const storageNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized')
11
12     const db = new kplus.StatefulSet(this, 'DB', {
13       containers: [{
14         image: 'db',
15         portNumber: 9000
16       }],
17       replicas: 2,
18       spread: true,
19       isolate: true
20     });
21     db.scheduling.attract(storageNodes);
22
23
24
25
26
27 }
28
29 const app = new App();
30 new WebCacheDB(app, 'app01');
31 app.synth();
```

3: AWS Builder ID ✓ CodeWhisperer

Ln 22, Col 5 Spaces: 2 UTF

apiVersion: apps/v1

kind: StatefulSet

metadata:

name: app01-db-c8ad66ec

spec:

minReadySeconds: 0

podManagementPolicy: OrderedReady

replicas: 2

selector:

serviceName: app01-db-service-c82d8efb

template:

metadata:

spec:

affinity:

nodeAffinity:

requiredDuringSchedulingIgnoredDuringExecution:

nodeSelectorTerms:

- matchExpressions:

- key: optimized

operator: In

values:

- storage

spread: true

podAntiAffinity:

requiredDuringSchedulingIgnoredDuringExecution:

- labelSelector:

matchLabels:

cdk8s.io/metadata.addr: app01-DB-c8a73f76

topologyKey: kubernetes.io/hostname

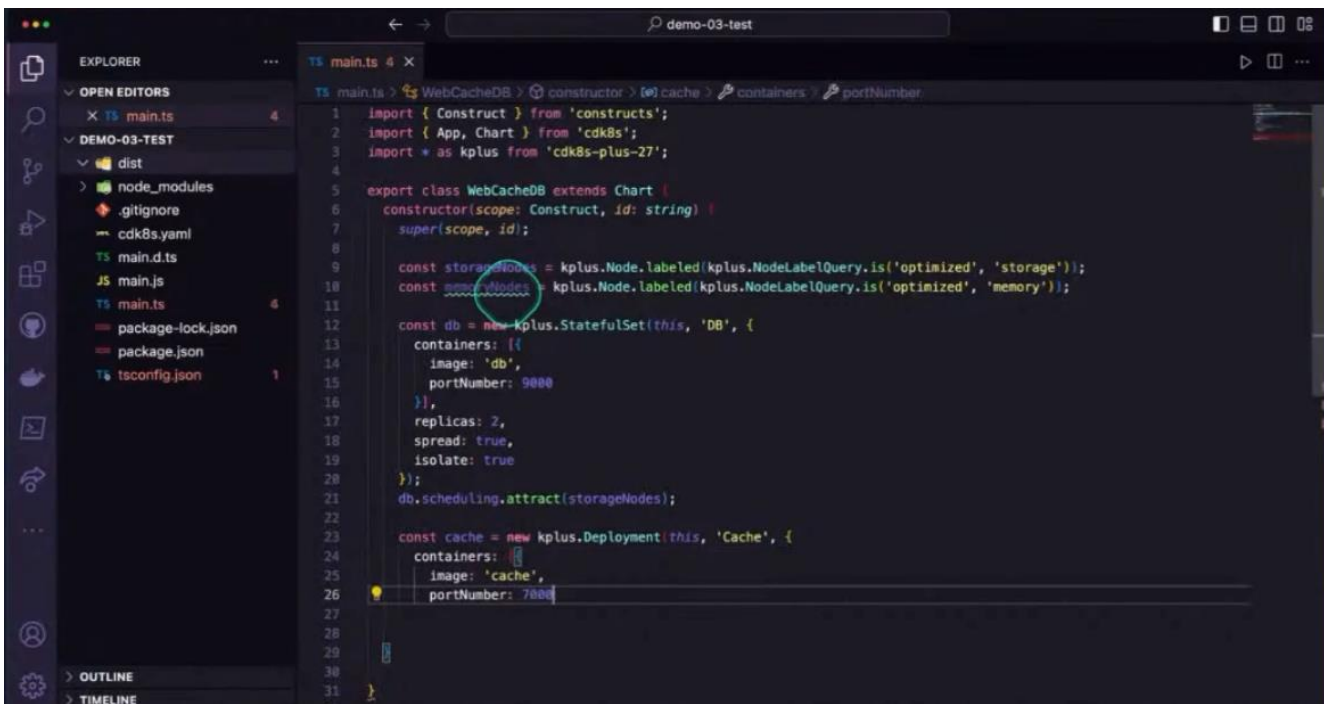
- labelSelector:

matchLabels:

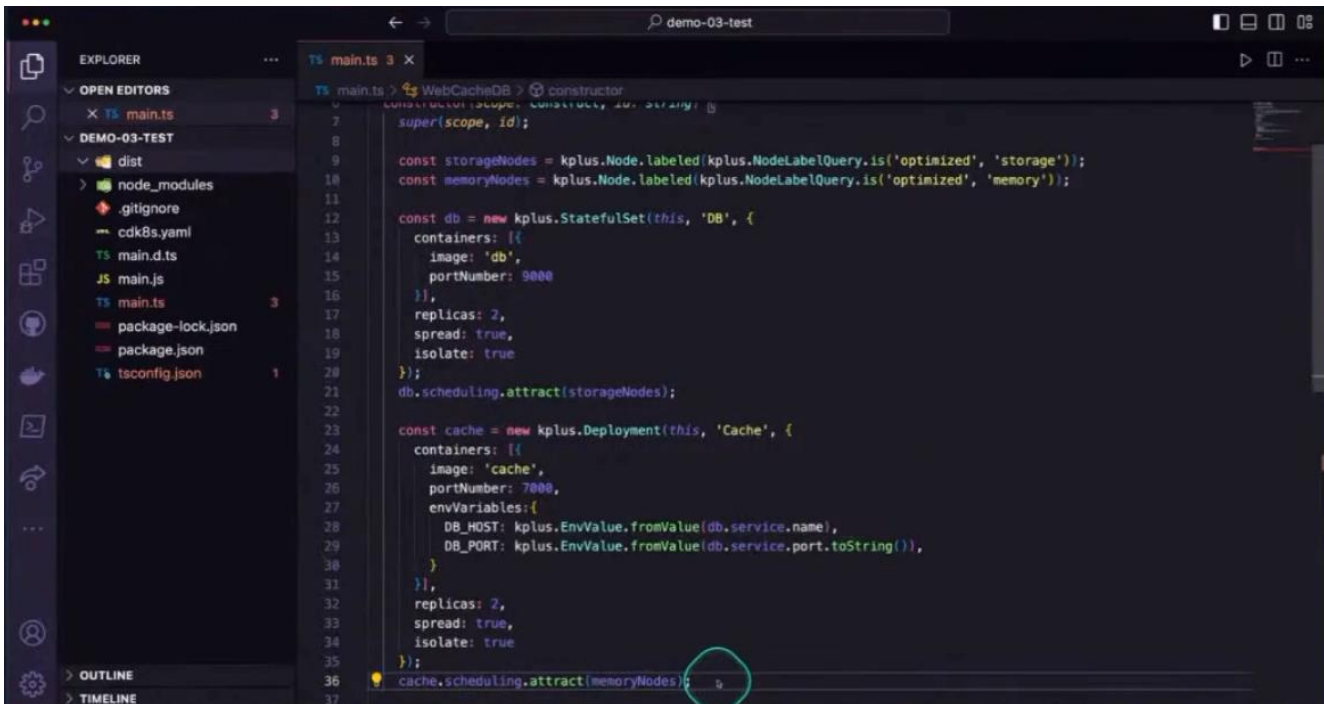
cdk8s.io/metadata.addr: app01-DB-c8a73f76

topologyKey: topology.kubernetes.io/zone





```
1 import { Construct } from 'constructs';
2 import { App, Chart } from 'cdk8s';
3 import * as kplus from 'cdk8s-plus-27';
4
5 export class WebCacheDB extends Chart {
6   constructor(scope: Construct, id: string) {
7     super(scope, id);
8
9     const storageNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized', 'storage'));
10    const memoryNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized', 'memory'));
11
12    const db = new kplus.StatefulSet(this, 'DB', {
13      containers: [{
14        image: 'db',
15        portNumber: 9000
16      }],
17      replicas: 2,
18      spread: true,
19      isolate: true
20    });
21    db.scheduling.attract(storageNodes);
22
23    const cache = new kplus.Deployment(this, 'Cache', {
24      containers: [{
25        image: 'cache',
26        portNumber: 7000
27      }],
28    });
29  }
30 }
31
```



```
27    });
28
29    const cache = new kplus.Deployment(this, 'Cache', {
30      containers: [{
31        image: 'cache',
32        portNumber: 7000,
33        envVariables: {
34          DB_HOST: kplus.EnvValue.fromValue(db.service.name),
35          DB_PORT: kplus.EnvValue.fromValue(db.service.port.toString()),
36        },
37      }],
38      replicas: 2,
39      spread: true,
40      isolate: true
41    });
42    cache.scheduling.attract(memoryNodes);
43  }
44 }
45
```

demo-03-test

EXPLORER

OPEN EDITORS

TS main.ts 3

DEMO-03-TEST

dist

node\_modules

.gitignore

cdk8s.yaml

TS main.d.ts

JS main.js

TS main.ts 3

package-lock.json

package.json

tsconfig.json 1

main.ts

```
1 constructor(scope: Construct, id: string) {
2   super(scope, id);
3
4   const storageNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized', 'storage'));
5   const memoryNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized', 'memory'));
6
7   const db = new kplus.StatefulSet(this, 'DB', {
8     containers: [{
9       image: 'db',
10      portNumber: 9000
11    }],
12    replicas: 2,
13    spread: true,
14    isolate: true
15  });
16  db.scheduling.attract(storageNodes);
17
18  const cache = new kplus.Deployment(this, 'Cache', {
19    containers: [{
20      image: 'cache',
21      portNumber: 7000,
22      envVariables: {
23        DB_HOST: kplus.EnvValue.fromValue(db.service.name),
24        DB_PORT: kplus.EnvValue.fromValue(db.service.port.toString()),
25      }
26    }],
27    replicas: 2,
28    spread: true,
29    isolate: true
30  });
31  cache.scheduling.attract(memoryNodes);
32}
```

Amazon CodeWhisperer helped to write

Ln 34, Col 20 Spaces: 2 UTF-8 LF TypeScript Go Live Prettier

demo-03-test

main.ts 3

```
1 constructor(scope: Construct, id: string) {
2   super(scope, id);
3
4   const storageNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized', 'storage'));
5   const memoryNodes = kplus.Node.labeled(kplus.NodeLabelQuery.is('optimized', 'memory'));
6
7   const db = new kplus.StatefulSet(this, 'DB', {
8     containers: [{
9       image: 'db',
10      portNumber: 9000
11    }],
12    replicas: 2,
13    spread: true,
14    isolate: true
15  });
16  db.scheduling.attract(storageNodes);
17
18  const cache = new kplus.Deployment(this, 'Cache', {
19    containers: [{
20      image: 'cache',
21      portNumber: 7000,
22      envVariables: {
23        DB_HOST: kplus.EnvValue.fromValue(db.service.name),
24        DB_PORT: kplus.EnvValue.fromValue(db.service.port.toString()),
25      }
26    }],
27    replicas: 2,
28    spread: true,
29    isolate: true
30  });
31  cache.scheduling.attract(memoryNodes);
32}
```

app01.k8s.yaml

```
1 apiVersion: v1
2 kind: Service
3 metadata:
4   name: app01
5 spec:
6   selector:
7     app: app01
8   ports:
9     - port: 80
10       targetPort: 7000
11
12 ---
13 apiVersion: v1
14 kind: Service
15 metadata:
16   name: app02
17 spec:
18   selector:
19     app: app02
20   ports:
21     - port: 80
22       targetPort: 9000
23
24 ---
25 apiVersion: apps/v1
26 kind: Deployment
27 metadata:
28   name: app01
29 spec:
30   replicas: 2
31   selector:
32     matchLabels:
33       app: app01
34   template:
35     metadata:
36       labels:
37         app: app01
38     spec:
39       containers:
40         - name: main
41           image: app01
42           ports:
43             - containerPort: 7000
44           resources:
45             limits:
46               cpu: 1500m
47               memory: 2048Mi
48             requests:
49               cpu: 1000m
50               memory: 512Mi
51           securityContext:
52             allowPrivilegeEscalation: false
53             privileged: false
54             readOnlyRootFilesystem: true
55           env:
56             - name: DB_HOST
57               value: app01-db-service-c872d8efb
58             - name: DB_PORT
59               value: "9000"
60           envVariables:
61             cy: Always
62             name: main
63             ports:
64               - containerPort: 7000
65             resources:
66               limits:
67                 cpu: 1500m
68                 memory: 2048Mi
69               requests:
70                 cpu: 1000m
71                 memory: 512Mi
72             securityContext:
73               allowPrivilegeEscalation: false
74               privileged: false
75               readOnlyRootFilesystem: true
76             env:
77               - name: DB_HOST
78                 value: app01-db-service-c872d8efb
79               - name: DB_PORT
80                 value: "9000"
```

WS Builder ID CodeWhisperer Ln 36, Col 43 Spaces: 2 UTF-8

demo-03-test

main.ts 3 X

main.ts > WebCacheDB > constructor

const db = new kplus.StatefulSet(this, 'DB', {  
 containers: [{  
 image: 'db',  
 portNumber: 9000  
 }],  
 replicas: 2,  
 spread: true,  
 isolate: true  
});  
db.scheduling.attract(storageNodes);  
  
const cache = new kplus.Deployment(this, 'Cache', {  
 containers: [{  
 image: 'cache',  
 portNumber: 7000,  
 envVariables: {  
 DB\_HOST: kplus.EnvValue.fromValue(db.service.name),  
 DB\_PORT: kplus.EnvValue.fromValue(db.service.port.toString()),  
 }  
 }],  
 replicas: 2,  
 spread: true,  
 isolate: true  
});  
cache.scheduling.attract(memoryNodes);

WS Builder ID ✓CodeWhisperer Ln 36, Col 43 Spaces: 2 UTF-8

113 maxUnavailable: 25%

114 type: RollingUpdate

115 template:

116 metadata:

117 labels:

118 cdk8s.io/metadata.addr: app01-Cache-c8772bc4

119 spec:

120 affinity:

121 nodeAffinity:

122 requiredDuringSchedulingIgnoredDuringExecution:

123 nodeSelectorTerms:

124 - matchExpressions:

125 - key: optimized

126 operator: In

127 values:

128 - memory

129 nodeSelectorTerms

130 requiredDuringSchedulingIgnoredDuringExecution:

131 - labelSelector:

132 matchLabels:

133 cdk8s.io/metadata.addr: app01-Cache-c8772bc4

134 topologyKey: Kubernetes.io/hostname

135 - labelSelector:

136 matchLabels:

137 cdk8s.io/metadata.addr: app01-Cache-c8772bc4

138 topologyKey: topology.kubernetes.io/zone

139 automountServiceAccountToken: false

140 containers:

141 - env:

142 - name: DB\_HOST

143 value: app01-db-service-c82d8efb

demo-03-test

main.ts 4 X

main.ts > WebCacheDB > constructor

DB\_PORT: kplus.EnvValue.fromValue(db.service.port.toString()),  
 }  
 },  
 replicas: 2,  
 spread: true,  
 isolate: true  
});  
cache.scheduling.attract(memoryNodes);  
const cacheService = cache.exposeViaService();  
  
const app = new App();  
new WebCacheDB(app, 'app01');  
app.synth();

WS Builder ID ✓CodeWhisperer Ln 39, Col 5 Spaces: 2 UTF-8

dist > app01.k8s.yaml > {} spec > [ ] egress > {} 0 > [ ]

184 policyTypes:

185 - Egress

186 - Ingress

187 Service: ClusterIP

188 apiVersion: v1

189 kind: Service

190 metadata:

191 name: app01-cache-service-c8a7a0cb

192 spec:

193 externalIPs: []

194 ports:

195 - port: 7000

196 targetPort: 7000

197 selector:

198 cdk8s.io/metadata.addr: app01-Cache-c8772bc4

199 type: ClusterIP

200 ---

201 apiVersion: networking.k8s.io/v1

202 kind: NetworkPolicy

203 metadata:

204 name: allowegressc8a73f76e494e8c62951e220a8

205 spec:

206 egress:



```
demo-03-test

EXPLORER
  OPEN EDITORS
    TS main.ts 1
  DEMO-03-TEST
    dist
    node_modules
    .gitignore
    cdk8s.yaml
    TS main.d.ts
    JS main.js
    TS main.ts 1
    package-lock.json
    package.json
    TS tsconfig.json 1

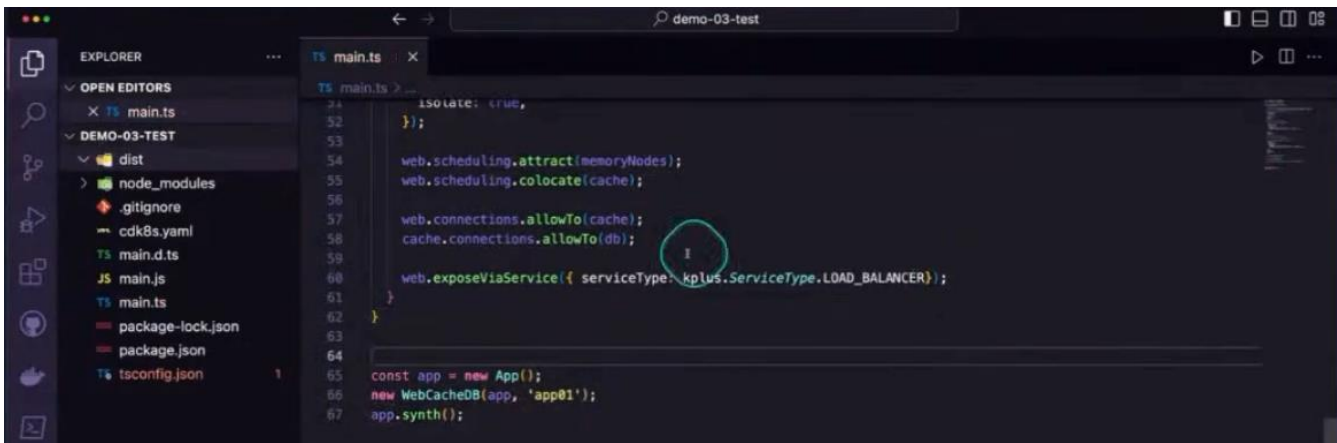
  OUTLINE
  TIMELINE

TS main.ts 1 X
  TS main.ts > WebCacheDB > constructor
    29 DB_PORT: kplus.EnvValue.fromValue(db.service.port.toString()),
    30 }
    31 },
    32 replicas: 2,
    33 spread: true,
    34 isolate: true
    35 });
    36 cache.scheduling.attract(memoryNodes);
    37
    38 const cacheService = cache.exposeViaService();
    39
    40 const web = new kplus.Deployment(this, 'Web', {
    41   containers: [{
    42     image: 'web',
    43     portNumber: 8080,
    44     envVariables: {
    45       CACHE_HOST: kplus.EnvValue.fromValue(cacheService.name),
    46       CACHE_PORT: kplus.EnvValue.fromValue(cacheService.port.toString()),
    47     }
    48   },
    49   replicas: 2,
    50   spread: true,
    51   isolate: true,
    52 });
    53
    54 web.scheduling.attract(memoryNodes);
    55 web.scheduling.colocate(cache);
    56
    57 web.connections.allowTo(cache);
    58 cache.connections.allowTo(db);
    59
```

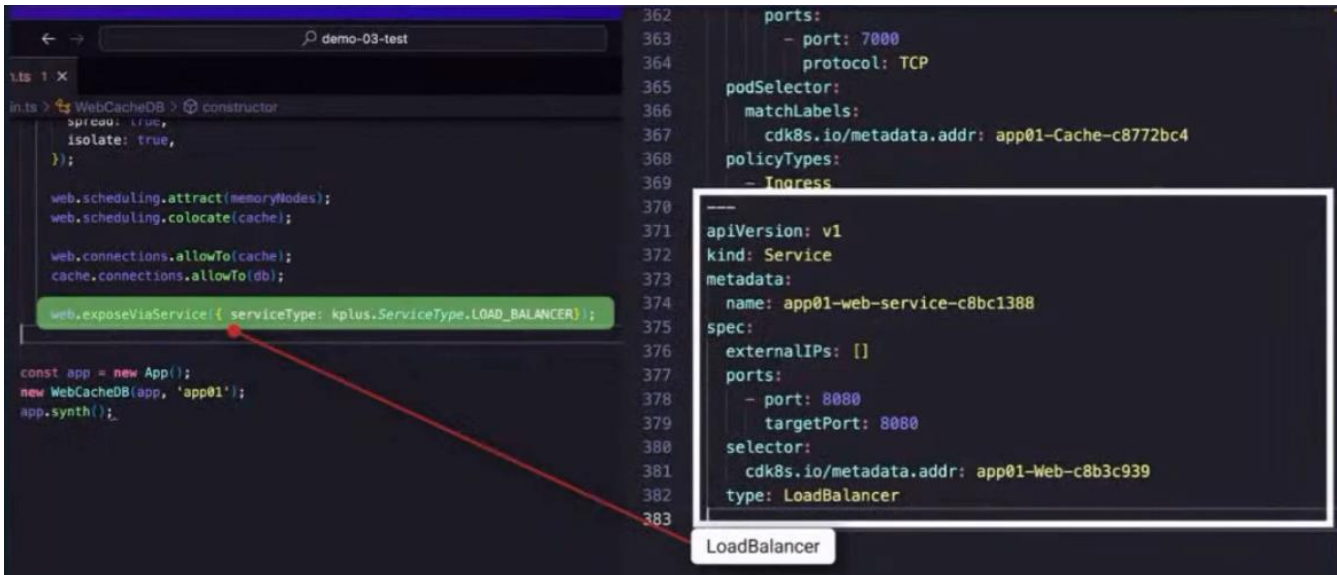
```
demo-03-test

main.ts 1 X
  TS main.ts > WebCacheDB > constructor
    29 DB_PORT: kplus.EnvValue.fromValue(db.service.port.toString()),
    30 }
    31 },
    32 replicas: 2,
    33 spread: true,
    34 isolate: true
    35 });
    36 cache.scheduling.attract(memoryNodes);
    37
    38 const cacheService = cache.exposeViaService();
    39
    40 const web = new kplus.Deployment(this, 'Web', {
    41   containers: [{
    42     image: 'web',
    43     portNumber: 8080,
    44     envVariables: {
    45       CACHE_HOST: kplus.EnvValue.fromValue(cacheService.name),
    46       CACHE_PORT: kplus.EnvValue.fromValue(cacheService.port.toString()),
    47     }
    48   },
    49   replicas: 2,
    50   spread: true,
    51   isolate: true,
    52 });
    53
    54 web.scheduling.attract(memoryNodes);
    55 web.scheduling.colocate(cache);
    56
    57 web.connections.allowTo(cache);
    58 cache.connections.allowTo(db);
    59

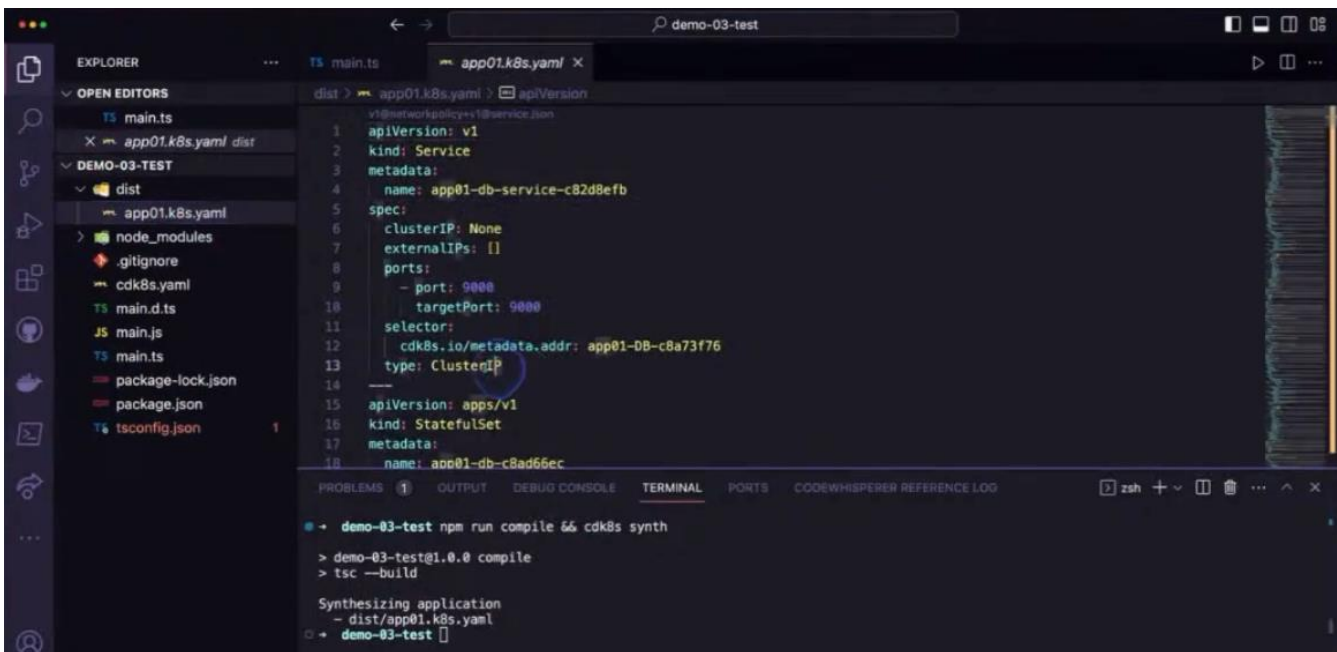
351 ---
352 apiVersion: networking.k8s.io/v1
353 kind: NetworkPolicy
354 metadata:
355   name: allowingressundefinedc8772bc41f0fc078ba7fe0e9-c
356 spec:
357   ingress:
358     - from:
359       - podSelector:
360         matchLabels:
361           cdk8s.io/metadata.addr: app01-Web-c8b3c93
362     ports:
363       - port: 7000
364         protocol: TCP
365   podSelector:
366     matchLabels:
367       cdk8s.io/metadata.addr: app01-Cache-c8772bc4
368   policyTypes:
369     - Ingress
370
371 NetworkPolicy-Isolation
372 kind: Service
373 metadata:
374   name: app01-web-service-c8bc1388
375 spec:
376   externalIPs: []
```



```
24 isolate: true,
25 };
26
27 web.scheduling.attract(memoryNodes);
28 web.scheduling.colocate(cache);
29
30 web.connections.allowTo(cache);
31 cache.connections.allowTo(db);
32
33 web.exposeViaService({ serviceType: kplus.ServiceType.LOAD_BALANCER});
34
35
36 const app = new App();
37 new WebCacheDB(app, 'app01');
38 app.synth();
```



```
362 ports:
363   - port: 7000
364     protocol: TCP
365
366 podSelector:
367   matchLabels:
368     cdk8s.io/metadata.addr: app01-Cache-c8772bc4
369
370 policyTypes:
371   - Ingress
372
373 ---
374 apiVersion: v1
375 kind: Service
376 metadata:
377   name: app01-web-service-c8bc1388
378 spec:
379   externalIPs: []
380   ports:
381     - port: 8080
382       targetPort: 8080
383   selector:
384     cdk8s.io/metadata.addr: app01-Web-c8b3c939
385   type: LoadBalancer
```



```
1 apiVersion: v1
2 kind: Service
3 metadata:
4   name: app01-db-service-c82d8efb
5 spec:
6   clusterIP: None
7   externalIPs: []
8   ports:
9     - port: 9000
10       targetPort: 9000
11   selector:
12     cdk8s.io/metadata.addr: app01-DB-c8a73f76
13   type: ClusterIP
14
15 ---
16 apiVersion: apps/v1
17 kind: StatefulSet
18 metadata:
19   name: app01-db-c8ad66ec
```

```
demo-03-test npm run compile && cdk8s synth
> demo-03-test@1.0.0 compile
> tsc --build

Synthesizing application
- dist/app01.k8s.yaml
demo-03-test
```

```

1 > apiVersion: v1-
14 ---
15 > apiVersion: apps/v1-
86 ---
87 apiVersion: networking.k8s.io/v1
88 kind: NetworkPolicy
89 metadata:
90   name: app01-db-defaultdenyall-c86d1087
91 spec:
92   podSelector:
93     matchLabels:
94       cdk8s.io/metadata.addr: app01-DB-c8a73f76
95   policyTypes:
96     - Egress
97     - Ingress
98 ---
99 apiVersion: apps/v1
100 kind: Deployment

```

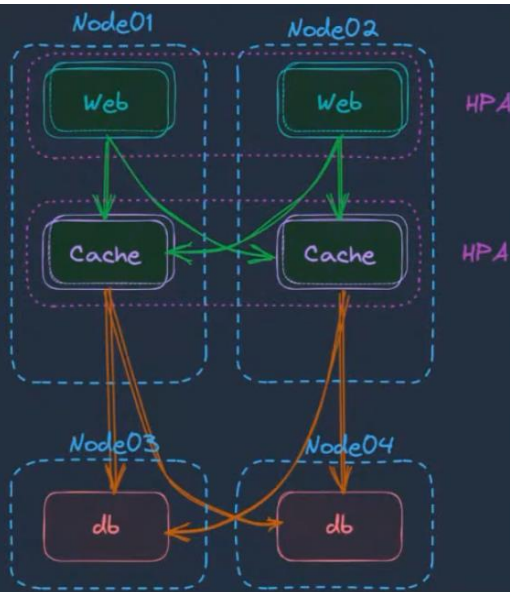
```

211 - podSelector:
212   matchLabels:
213     cdk8s.io/metadata.addr: app01-DB-c8a73f76
214
215 podSelector:
216   matchLabels:
217     cdk8s.io/metadata.addr: app01-Cache-c8772bc4
218   policyTypes:
219     - Egress
220 ---
221 apiVersion: networking.k8s.io/v1
222 kind: NetworkPolicy
223 metadata:
224   name: allowingressundefinedc8a73f76e494e8c62951e228-c85fc9a5
225 spec:
226   ingress:
227     - from:
228       - podSelector:
229         matchLabels:
230           cdk8s.io/metadata.addr: app01-Cache-c8772bc4

```

## Requirements

- 2 tier application Web -> Cache
- High availability
- Web and cache closer to each other
- Web service - public available
- Cache and db - internal access
- Network Isolation:
  - Cache only allows web connections
  - db only allows cache connections
- Scalability - horizontal scaling for web and cache layer
  - Karpenter (HELM)
  - HPA



## Karpenter + HELM



# Install Karpenter use HELM charts

```
8 new Helm(this, 'karpenter', {
9   chart: 'oci://public.ecr.aws/karpenter/karpenter',
10  version: 'v0.30.0',
11  values: {
12    settings: {
13      aws: {
14        clusterName: "karpenter-cluster",
15        defaultInstanceProfile: "KarpenterNodeInstanceProfile-karpenter-cluster",
16        interruptionQueueName: "karpenter-cluster"
17      },
18    },
19  },
20 });
21 }
```

CDK supports Helm charts natively and we can find constructs to use

## Scale Web Layer

```
const web = new kplus.Deployment(this, 'web', {
  containers: [{
    image: 'web',
    portNumber: 80,
    envVariables: {
      CACHE_HOST: kplus.EnvValue.fromValue(cacheService.name),
      CACHE_PORT: kplus.EnvValue.fromValue(cacheService.port.toString()),
    },
  }],
  spread: true,
  isolate: true,
});

web.exposeViaService({ serviceType: kplus.ServiceType.LOAD_BALANCER })
new kplus.HorizontalPodAutoscaler(this, 'HPA', {
  target: web,
  maxReplicas: 100,
  minReplicas: 2,
  metrics: [kplus.Metric.resourceCpu(kplus.MetricTarget.averageUtilization(80))]
});
```

cdk8s-examples Public

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main 3 branches 0 tags

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File/Folder	Commit	Date
cdk8s-automation	chore(deps): upgrade configuration (#237)	758c7b8 12 hours ago
.github	chore(deps): upgrade configuration (#187)	last month
.projen	chore(deps): upgrade configuration (#185)	last month
git-hooks	chore: migrate examples from the cdk8s-team/cdk8s repository (#1)	5 months ago
go	chore(deps): upgrade configuration (#206)	2 weeks ago
java	chore(deps): upgrade dev dependencies (#186)	last month
python	chore(deps): upgrade configuration (#190)	last month
typescript	chore(deps): upgrade configuration (#190)	last month
.gitattributes	chore(deps): upgrade configuration (#118)	2 months ago
.gitignore	chore(deps): upgrade configuration (#118)	2 months ago

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Activity

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<https://github.com/cdk8s-team/cdk8s-examples>

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📄 DCO	chore: migrate examples from the <code>cdk8s-team/cdk8s</code> repository (#1)	5 months ago
📄 LICENSE	chore: migrate examples from the <code>cdk8s-team/cdk8s</code> repository (#1)	5 months ago
📄 README.md	Initial commit	7 months ago
📄 SECURITY.md	chore: migrate examples from the <code>cdk8s-team/cdk8s</code> repository (#1)	5 months ago
📄 go.work	chore: kubernetes end to end aws (#2)	4 months ago
📄 go.work.sum	chore(deps): upgrade dependencies (#69)	3 months ago
📄 lerna.json	chore: migrate examples from the <code>cdk8s-team/cdk8s</code> repository (#1)	5 months ago
📄 package.json	chore(deps): upgrade configuration (#219)	last week
📄 yarn.lock	chore(deps): upgrade configuration (#237)	12 hours ago

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No releases published


### Packages

No packages published

### Contributors 3

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### Languages

Java 42.6%

Python 25.1%

Go 17.8%

TypeScript 14.5%