



# 빠르고 경제적인 Kubernetes 클러스터 도입하기

2023년 7월

Akamai Technologies

강상진, APJ Compute Specialist



TRAFFIC

102.17M

Hits/sec

UTILIZATION

135.99

terabits/sec

# Akamai 커넥티드 클라우드

오늘날 중앙 집중식 클라우드 컴퓨팅 플랫폼이 제공하는  
비용, 성능 및 규모 문제를 해결하기 위해  
Core(클라우드 리전)-to-Edge(CDN PoP) 인프라 전체에  
워크로드 및 애플리케이션을 분산



# Akamai 커넥티드 클라우드



콘텐츠  
전달



보안 서비스



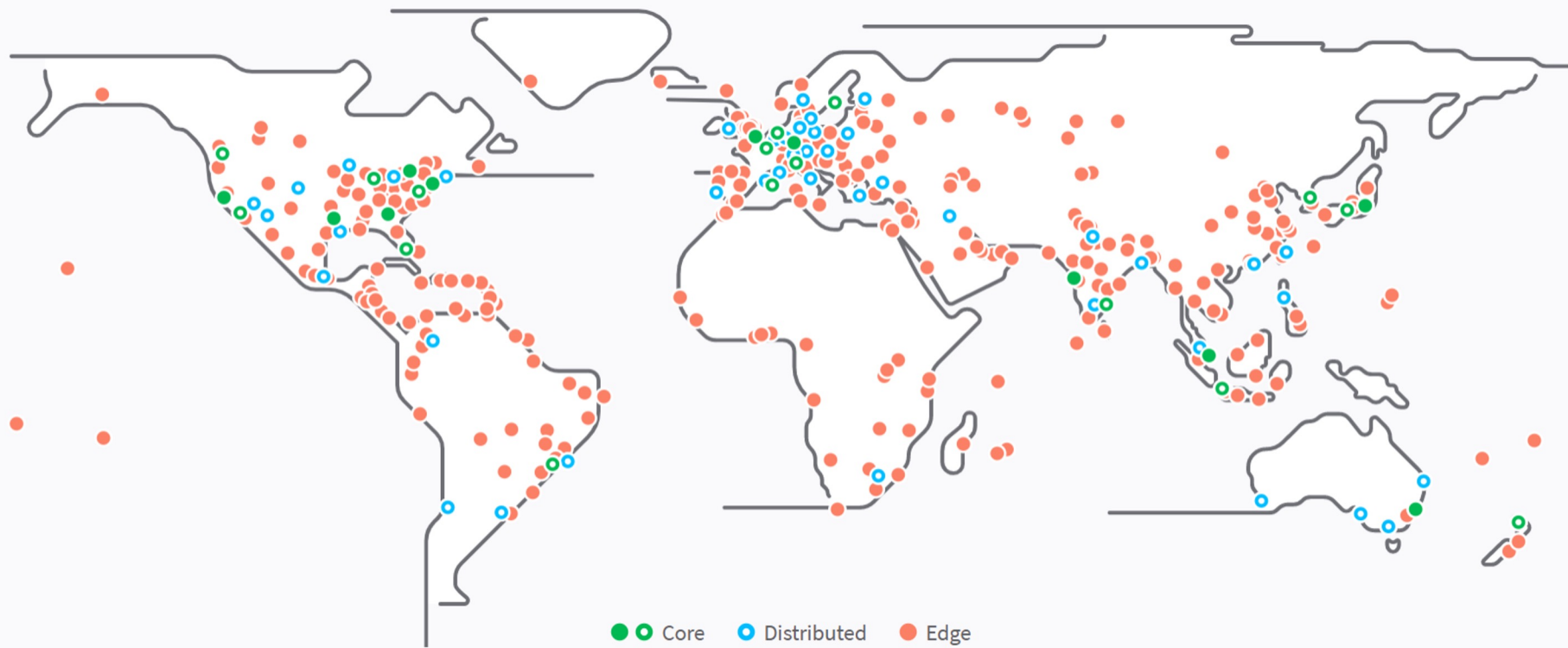
클라우드  
컴퓨팅

## 고객 지원 서비스



- 기술 지원
- 엔터프라이즈 아키텍처
- 보안 C&C 센터
- 미디어 운영 센터
- 성능 테스트
- 파트너십 및 제휴

# 독보적인 글로벌 입지



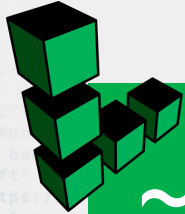


+



linode

애플리케이션 개발/운영/배포/CDN/보안/인증/인가/모니터링/분석  
in one box of Akamai



~ 15만개

고객 수

~ 20년

클라우드 비즈니스

글로벌

데이터센터 분포

# Across The Cloud Continuum.



**EDGE**  
SERVERLESS COMPUTE

**135+**  
COUNTRIES

**4200+**  
LOCATIONS



**DISTRIBUTED**  
VMs + CONTAINERS

**FUTURE**  
**20+**  
COUNTRIES

**100s**  
REGIONS



**CLOUD CORE**  
FULL COMPUTE + STORAGE

**8+**  
COUNTRIES

**11s**  
REGIONS

# Core 데이터센터 확장 계획



\* 2023년 3월 기준

First 3 sites live in 1H of 2023

## Existing Data Centers

- Atlanta
- Dallas
- Fremont
- Frankfurt
- London
- Mumbai
- Newark
- Singapore
- Sydney
- Tokyo
- Toronto

## 2023 Planned Data Centers

- Amsterdam
- Auckland
- Chennai
- Chicago
- Jakarta
- Los Angeles
- Madrid
- Miami
- Milan
- Osaka
- Paris
- São Paulo
- Seattle
- Seoul
- Stockholm
- Washington D.C.



# Distributed 데이터센터 확장 계획









\* 2023년 3월 기준

## Installs Beginning 2H of 2023




Americas			EMEA				APJ	
Bogota	Houston	Phoenix	Athens	Dublin	Johannesburg	Rome	Adelaide	Kuala Lumpur
Boston	Las Vegas	Queretaro	Barcelona	Dusseldorf	Lisbon	Vienna	Bangalore	Manila
Buenos Aires	Mexico City	Rio de Janeiro	Brussels	Hamburg	Marseille	Warsaw	Brisbane	Melbourne
Denver	Minneapolis	Santiago	Berlin	Helsinki	Munich	Zurich	Calcutta	Perth
Detroit			Copenhagen	Istanbul	Oslo		Delhi	Taipei
							Hong Kong	

# Akamai 클라우드 제품군






## 컴퓨트

 Shared CPU	 Dedicated CPU	 High Memory
 GPU	 Bare Metal	 Kubernetes





## 스토리지

 Block Storage	 Object Storage	 Backups
--	--	--



## 네트워킹

 DDoS Protection	 Node Balancers	 DNS Manager
 Cloud Firewall		 VLAN

## 관리형 데이터베이스

 MySQL	 PSQL	 MongoDB	 Redis
--	---	--	--

## 서비스

 Managed Service	 Professional Services
--	--

# Akamai 클라우드가 인기있는 이유



- 핵심 컴퓨팅 및 스토리지 기본 요소
- 직관적인 API, CLI 및 클라우드 인터페이스
- 광범위한 기술 문서, Q&A, 개발자 포털, 블로그 등



- 시장에서 최고의 가격 대비 성능
- 모든 리전(데이터 센터)에서 예측 가능한 정액 요금을 제공
- 숨겨진 수수료가 없음



- 100% 인적, 연중무휴 무료 전화 지원
- 91%의 CSAT
- 인증된 Linux 관리자들의 기술 지원

# 가격 비교

Shared

Dedicated

High Memory

GPU

## Configuration



CPU

8

Memory

16 GB

Storage

2,320 GB

Transfer

8 TB

## Additional Storage

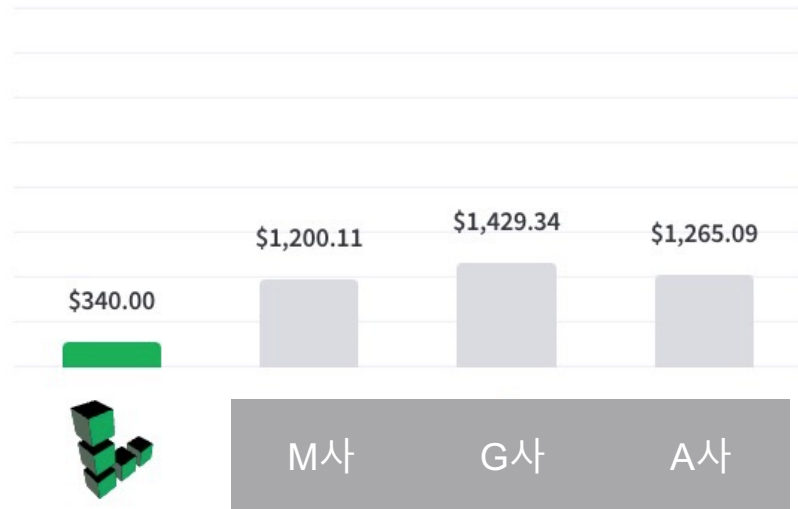


+2 TB

## Additional Transfer



+2 TB

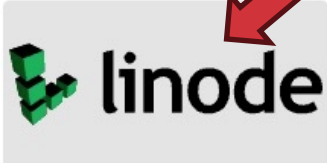









# Akamai의 Kubernetes 서비스

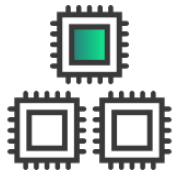
https://www.cncf.io/certification/software-conformance/

**CLOUD NATIVE COMPUTING FOUNDATION**

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 <b>Linode</b> Linode Kubernetes Engine Linode	 <b>Microsoft Azure</b> Microsoft AKS Engine for Azure Stack ★ 6 Microsoft MCap: \$2.1T	 <b>NHN Cloud</b> NHN Kubernetes Service (NKS) Funding: \$121.7M NHN Cloud	 <b>NIFCLOUD Hatoba</b> NIFCLOUD Kubernetes Service Hatoba MCap: \$25.7B Fujitsu
 <b>NUTANIX</b> Nutanix Karbon MCap: \$5.7B Nutanix	 <b>ORACLE</b> Oracle Container Engine MCap: \$256B Oracle	 <b>orka</b> Orka Funding: \$65.7M MacStadium	 <b>OVHcloud</b> OVH Managed Kubernetes Service MCap: \$2.1B OVHcloud

# Akamai의 Kubernetes 서비스



## 극대화된 리소스 효율성

클라우드 리소스를 최대한 자동으로 활용하여 클러스터 전체에 리소스를 효율적으로 활용하며 컨테이너를 원활하게 배포



## 요구사항에 맞게 클러스터 자동 확장

Horizontal Cluster Autoscaling으로 설정된 한도에 따라 실시간으로 리소스를 생성하고 폐기 노드 풀을 효율적으로 관리함으로써 가용성과 애플리케이션 안정성을 추구

## 관리 요금 없음

컴퓨팅 인스턴스, NodeBalancers, Block Storage Volumes에 대한 비용만 지불. 기타 클라우드 사업자와 달리 관리형 쿠버네티스 컨트롤 플레인의 경우 관리비를 청구하지 않음

*\*타 CSP의 경우 시간당 \$0.10 또는 월 \$73의 클러스터 관리 수수료를 부과*



## Helm 차트, Operators, Controllers로 배포

쿠버네티스 오픈 소스 생태계의 도구를 활용. Rancher, Helm, Operators 등 인기 있는 쿠버네티스 관련 도구와의 통합을 지원

## 개발자 친화적, 높은 이식성

API를 통해 직접 LKE 클러스터를 생성하고 관리해 쿠버네티스 관리를 자체 인프라와 통합. 기존 애플리케이션과 워크로드를 빠르게 이전



# LKE (Linode Kubernetes Engine)

- 빠르고 간편하게 Kubernetes 클러스터를 클라우드에서 생성

https://cloud.linode.com/kubernetes/create

Create

Search for Linodes, Volumes, NodeBalancers, Domains, Buckets, Tags...

Kubernetes / Create Cluster

Cluster Label  
OpenInfra\_K8s\_Cluster

Region  
You can use [our speedtest page](#) to find the best region for your current location.  
Tokyo, JP (ap-northeast)

Kubernetes Version  
1.26

Add Node Pools  
Add groups of Linodes to your cluster. You can have a maximum of 100 Linodes per node pool.

Dedicated CPU Shared CPU High Memory Premium

Shared CPU instances are good for medium-duty workloads and are a good mix of performance, resources, and price.

Plan	Monthly	Hourly	RAM	CPUs	Storage				
Linode 2 GB	\$12	\$0.018	2 GB	1	50 GB	-	0	+	Add
Linode 4 GB	\$24	\$0.036	4 GB	2	80 GB	-	3	+	Add

Cluster Summary

Linode 2 GB Plan  
1 CPU, 50 GB Storage

3

\$36.00/month

Enable HA Control Plane  
A high availability (HA) control plane is replicated on multiple master nodes to provide 99.99% uptime, and is recommended for production workloads. [Learn more about the HA control plane.](#)

\$60.00/month

\$96.00/mo

Create Cluster

# LKE (Linode Kubernetes Engine)

## Kubernetes / OpenInfra-K8s-Cluster

Docs

Version 1.26

3 CPU Cores

Kubernetes API Endpoint:

HA CLUSTER

[Kubernetes Dashboard](#)

[Delete Cluster](#)

Tokyo, JP

6 GB RAM

https://f9e6d766-4fc3-443d-9e3e-1c13f7c67dba.ap-northeast-1.linodek8e.net:443

\$96.00/month

150 GB Storage

Kubeconfig:

[OpenInfra-K8s-Cluster-kubeconfig.yaml](#) | [View](#) | [Reset](#)

[Add a tag +](#)

## Node Pools

[Recycle All Nodes](#)

[Add A Node Pool](#)

### Linode 2 GB

[Autoscale Pool](#)

[Resize Pool](#)

[Recycle Pool Nodes](#)

[Delete Pool](#)

Linode ^	Status ^	IP Address ^	
<a href="#">lke117166-173841-64a008b853be</a>	<span style="color: green;">●</span> Running	172.104.75.69	<a href="#">Recycle</a>
<a href="#">lke117166-173841-64a008b8bb8f</a>	<span style="color: green;">●</span> Running	172.104.75.83	<a href="#">Recycle</a>
<a href="#">lke117166-173841-64a008b92486</a>	<span style="color: green;">●</span> Running	172.104.75.77	<a href="#">Recycle</a>
Pool ID 173841			



# LKE (Linode Kubernetes Engine)

- 3개 이상의 워커 노드 권고 및 오토 스케일링 지원

Kubernetes / OpenInfra-K8s-Cluster Docs

Version 1.26    3 CPU Cores    Kubernetes API Endpoint: <https://f9e6d766-4fc3-443d-9e3e-1c13f7c67dba.ap-northeast-1.linodek8e.net:443>    HA CLUSTER    [Kubernetes Dashboard](#)    [Delete Cluster](#)

Tokyo, JP    6 GB RAM

\$96.00/month    150 GB Storage

Kubeconfig: [OpenInfra-K8s-Cluster-kubeconfig.yaml](#)    [View](#)    [Reset](#)    [Add a tag +](#)

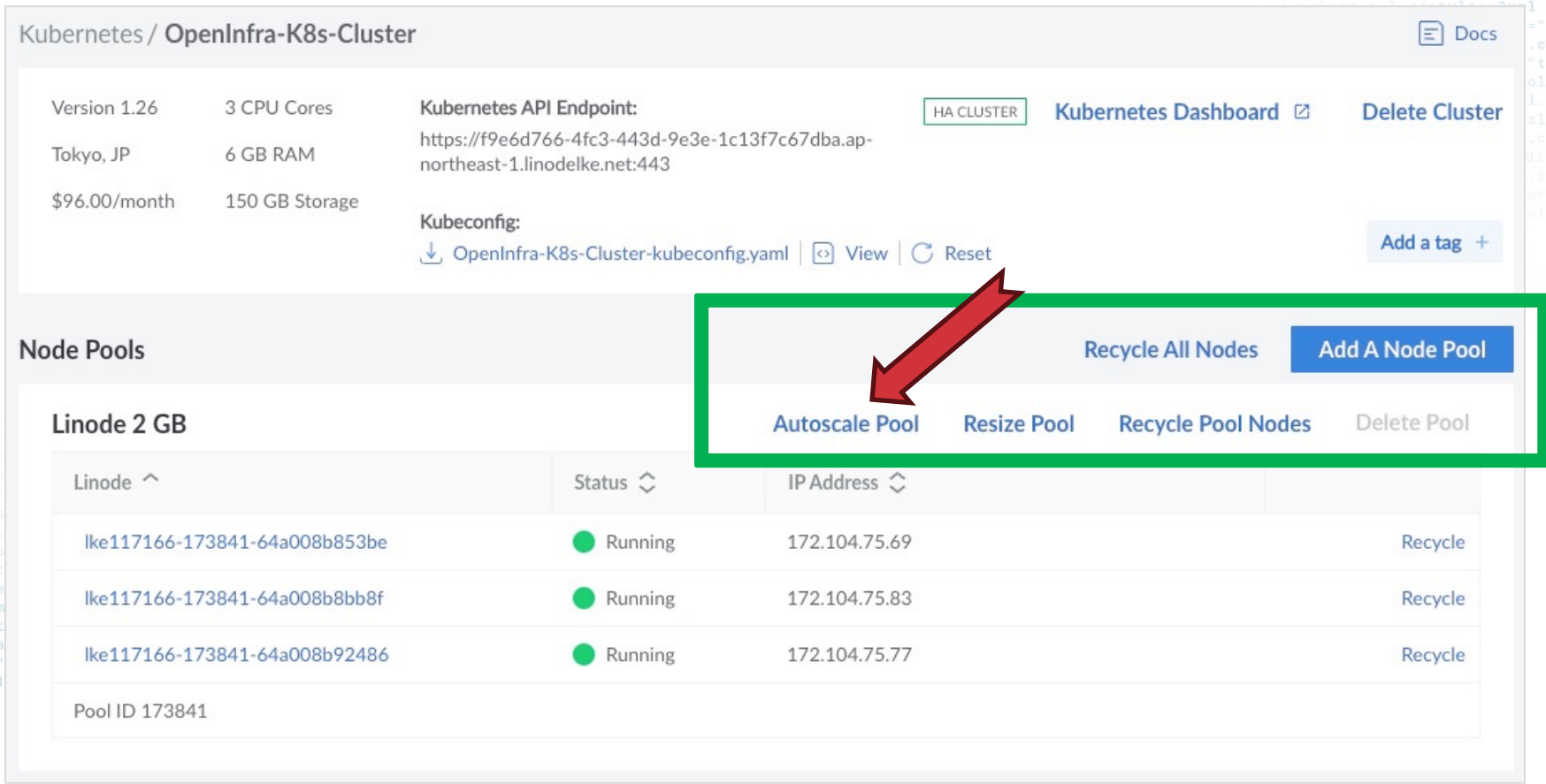
### Node Pools

[Recycle All Nodes](#)    [Add A Node Pool](#)

[Autoscale Pool](#)    [Resize Pool](#)    [Recycle Pool Nodes](#)    [Delete Pool](#)

Linode ^	Status ⇅	IP Address ⇅	
<a href="#">lke117166-173841-64a008b853be</a>	● Running	172.104.75.69	<a href="#">Recycle</a>
<a href="#">lke117166-173841-64a008b8bb8f</a>	● Running	172.104.75.83	<a href="#">Recycle</a>
<a href="#">lke117166-173841-64a008b92486</a>	● Running	172.104.75.77	<a href="#">Recycle</a>

Pool ID 173841





# LKE (Linode Kubernetes Engine)

Node Pools Recycle All Nodes Add a Node Pool

Linode 2 GB Autoscale Pool Resize Pool Recycle Pool Nodes Delete Pool


Linode ^	Status ^	IP Address ^	
lke83159-127587-63922e6379a9	Running	192.0.2.142	Recycle
lke83159-127587-63922e639de4	Running	192.0.2.172	Recycle
lke83159-127587-63922e63c088	Running	192.0.2.237	Recycle
Pool ID 127587			

- 워커 노드 풀의 크기 조절
- 오토스케일링 옵션

Add a Node Pool: example-cluster

Dedicated CPU Shared CPU High Memory

Plan	Monthly	Hourly	RAM	CPUs	Storage			
Dedicated 4 GB	\$30	\$0.045	4 GB	2	80 GB	-	0	+
Dedicated 8 GB	\$60	\$0.09	8 GB	4	160 GB	-	0	+
Dedicated 16 GB	\$120	\$0.18	16 GB	8	320 GB	-	0	+



# LKE (Linode Kubernetes Engine)

☰ Create ▾ Search for Linodes, Volumes, N

Kubernetes / **example-cluster**

Version 1.24    3 CPU Cores  
Newark, NJ    6 GB RAM  
\$30.00/month    150 GB Storage

Kubernetes API Endpoint:  
https://532de016-2b9a-47f0-b551-0763eb40b12f.us-east-2

Kubeconfig:

### Resize Pool: Linode 2 GB Plan

Current pool: \$30/month (3 nodes at \$10/month)

Enter the number of nodes you'd like in this pool:

Resized pool: \$40/month (4 nodes at \$10/month)

Save Changes

- 워커 노드 풀의 크기 조절
- 오토스케일링 옵션

Kubernetes / **example-cluster**

Autoscale Pool

Set minimum and maximum node pool constraints for LKE to resize your cluster automatically based on resource demand and overall usage. Maximum limit is 100 nodes. [Learn More.](#)

Autoscaler

Min:  / Max:

Cancel    Save Changes

Nodes    Add a Node Pool

Pool Nodes    Delete Pool

Recycle

Recycle

# LKE (Linode Kubernetes Engine)

Kubernetes / newcluster

Version 1.21   3 CPU Cores   Kubernetes API Endpoint  
https://afb2c665-cfe1-4954-9a64-d17c13aa1ed8.us-east-2.linode.lke.net:443

Newark, NJ   6 GB RAM

\$30/month   150 GB Storage

Kubeconfig  
[newcluster-kubeconfig.yaml](#) | [View](#) | [Reset](#)

[Kubernetes dashboard](#) | [Delete Cluster](#) | [Upgrade to HA](#)

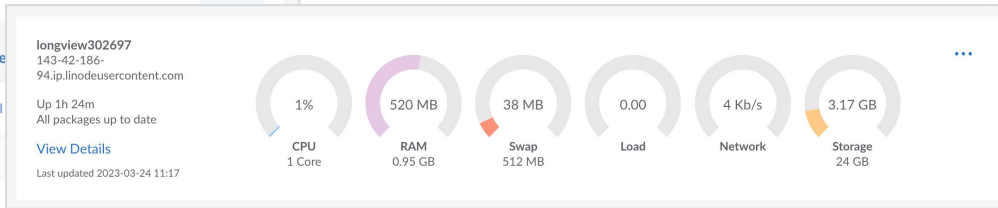
[Add a tag](#) +  
biz x

Node Pools

Linode 2 GB   Autoscale Pool   Resize Pool

Linode	Status	IP Address
ike20837-26312-60427b19d1c2	Running	97.107.130.125

- 클러스터 대시보드
- VM 단위의 모니터링 또한 제공



## Kubernetes Dashboard

### Token

Every Service Account has a Secret with valid Bearer Token that can be used to log in to Dashboard. To find out more about how to configure and use Bearer Tokens, please refer to the [Authentication](#) section.

### Kubeconfig

Please select the kubeconfig file that you have created to configure access to the cluster. To find out more about how to configure and use kubeconfig file, please refer to the [Configure Access to Multiple Clusters](#) section.

Enter token \*

.....

[Sign in](#)

# LKE (Linode Kubernetes Engine)

- 클러스터 대시보드

The screenshot shows the Linode Kubernetes Engine (LKE) cluster dashboard. The interface is dark-themed with a blue header bar. The sidebar on the left contains navigation links for Workloads, Service, Config and Storage, and Cluster. The main content area is divided into several sections:

- Workload Status:** A summary section showing three green circles representing the status of Deployments, Pods, and Replica Sets. Each circle has a line pointing to the text "Running: 1" below it.
- Deployments:** A table listing the deployment details.
- Pods:** A table listing the pod details.

Name	Images	Labels	Pods	Created ↑
my-lamp-lamp	httpd:2.4-alpine php:7-fpm-alpine	app: lamp app.kubernetes.io/managed-by: Helm chart: lamp-1.1.5 <a href="#">Show all</a>	1 / 1	a.minute.agg

Name	Images	Labels	Node	Status	Restarts	CPU Usage (cores)	Memory Usage (bytes)	Created ↑
my-lamp-lamp-5fd985cf68-jwvz4	httpd:2.4-alpine php:7-fpm-alpine	app: lamp pod-template-hash: 5fd985cf68	lke55127-86393-622f8d09399a	Running	0	-	-	a.minute.agg

# LKE (Linode Kubernetes Engine)

- 대시보드내에서 리소스 생성하기 - kubectl 대용



default

Search



Create new resource

Create

Workloads <sup>N</sup>

Cron Jobs

Daemon Sets

Deployments

Jobs

Pods

Replica Sets

Replication Controllers

Stateful Sets

Service <sup>N</sup>

Ingresses

Services

Config and Storage

Config Maps <sup>N</sup>

Persistent Volume Claims <sup>N</sup>

Secrets <sup>N</sup>

Create from input

Create from file

Create from form

Enter YAML or JSON content specifying the resources to create to the currently selected namespace. [Learn more](#)

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: nginx-deployment
5  spec:
6    selector:
7      matchLabels:
8        app: nginx
9    replicas: 2
10   template:
11     metadata:
12       labels:
13         app: nginx
14     spec:
15       containers:
16         - name: nginx
17           image: nginx:1.14.2
18           ports:
19             - containerPort: 80
```

Upload

Cancel

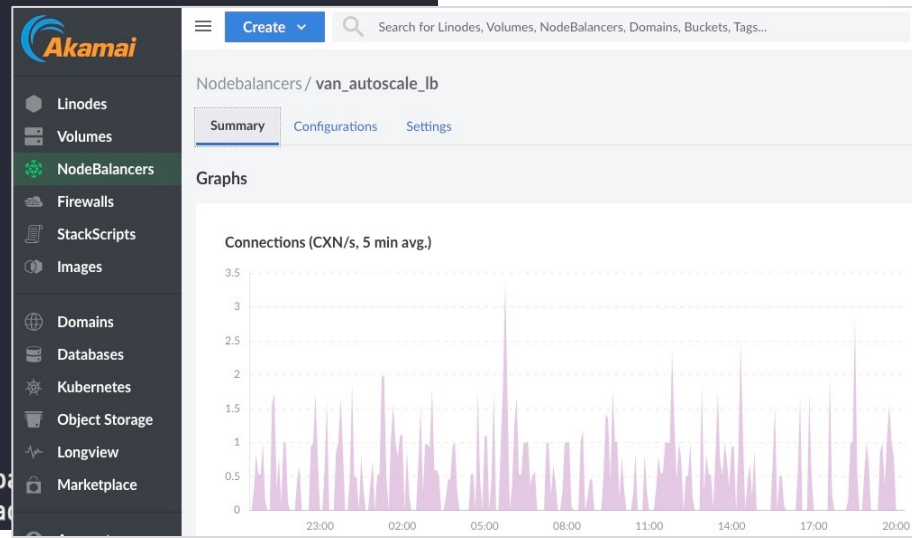
# LKE (Linode Kubernetes Engine)

- LoadBalancer 타입의 Service 리소스 제공

```
~ kubectl get service
NAME                TYPE          CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
hello1-service-lb  LoadBalancer  10.128.207.202  172.104.37.252  80:31437/TCP     18s
kubernetes          ClusterIP     10.128.0.1      <none>           443/TCP          27h
```

```
~ kubectl describe service hello1-service-lb
Name:                hello1-service-lb
Namespace:           default
Labels:              <none>
Annotations:         <none>
Selector:            app=hello-one
Type:                LoadBalancer
IP Family Policy:    SingleStack
IP Families:         IPv4
IP:                  10.128.207.202
IPs:                 10.128.207.202
LoadBalancer Ingress: 172.104.37.252
Port:                <unset> 80/TCP
TargetPort:          80/TCP
NodePort:            <unset> 31437/TCP
Endpoints:           <none>
Session Affinity:    None
External Traffic Policy: Cluster
Events:
```

Type	Reason	Age	From	Message
Normal	EnsuringLoadBalancer	65s	service-controller	Ensuring load balancer
Normal	EnsuredLoadBalancer	64s	service-controller	Ensured load balancer





# LKE (Linode Kubernetes Engine)

- Block Storage 형태의 Persistent Volume 리소스 제공

```
~$ kubectl get persistentvolume
NAME                CAPACITY  ACCESS MODES  RECLAIM POLICY  STATUS  CLAIM                STORAGECLASS  REASON  AGE
pvc-2e260ccc156a4674  10Gi      RWO           Retain          Released  default/pvc-example  linode-block-storage-retain
pvc-3cba285159044a61  10Gi      RWO           Retain          Released  default/pvc-example7  linode-block-storage-retain
pvc-50a5b14498e54fde  10Gi      RWO           Retain          Released  default/pvc-examplei4  linode-block-storage-retain
pvc-7e537458b25b41bd  10Gi      RWO           Retain          Bound     default/pvc-example7  linode-block-storage-retain
```

Label	Status	Region	Size	Attached To	Actions
temp-47345846	Active	Tokyo, JP	30 GB	Windows_VM_StackScripts2	Show Config Edit ...
temp-47338202	Active	Tokyo, JP	30 GB	windows-ap-northeast	Show Config Edit ...
pvc7e537458b25b41bd	Active	Singapore, SG	10 GB	lke116964-173565-649e8fabd85b	Show Config Edit ...

해당 PV를 사용하는 Pod이 배치된 워커 노드에 Attach 형태

