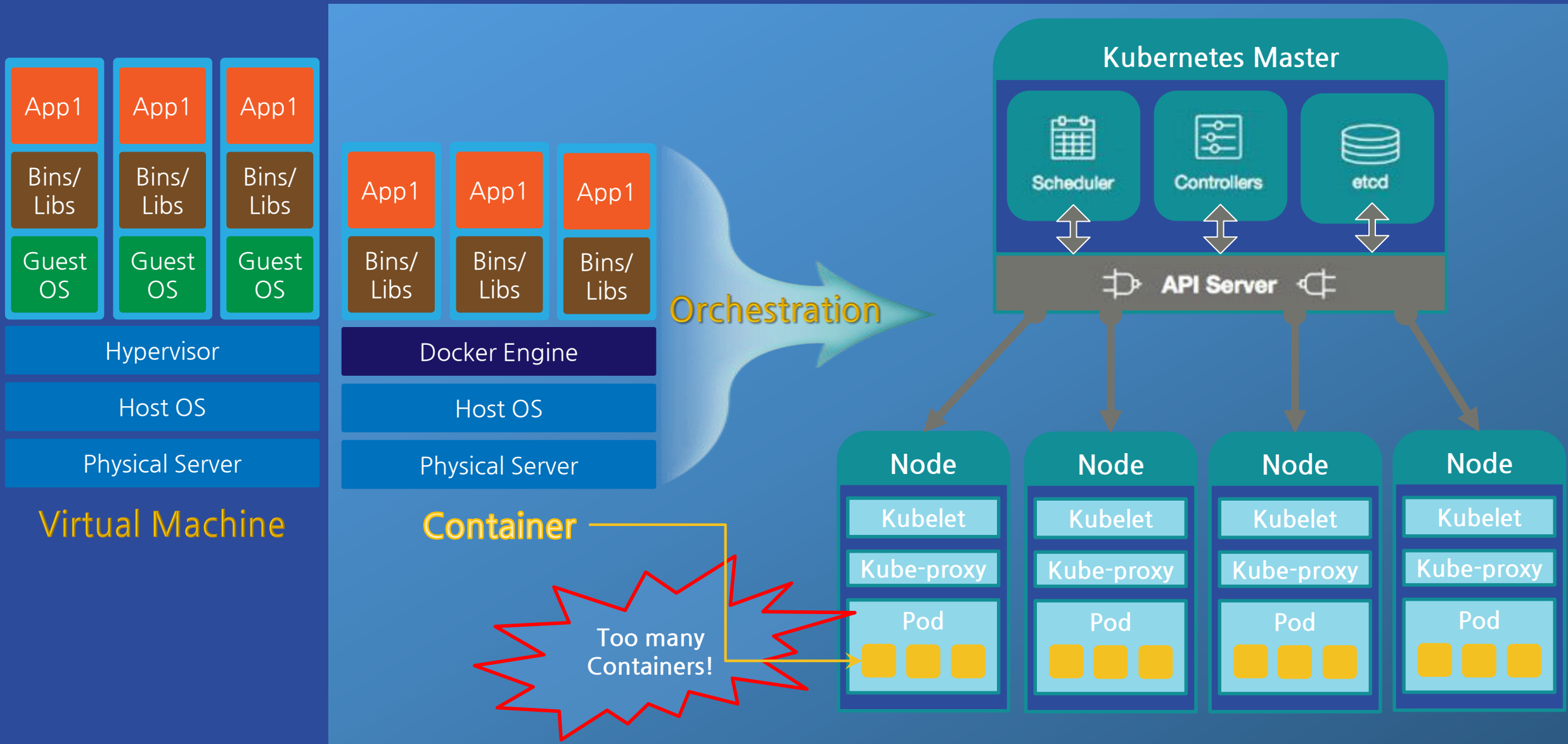


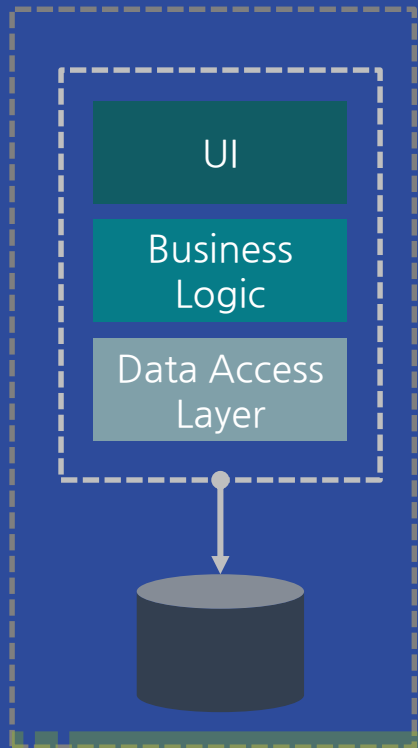
Full Stack Monitoring all over DELL APEX and Cloud

Introduction of CloudHub

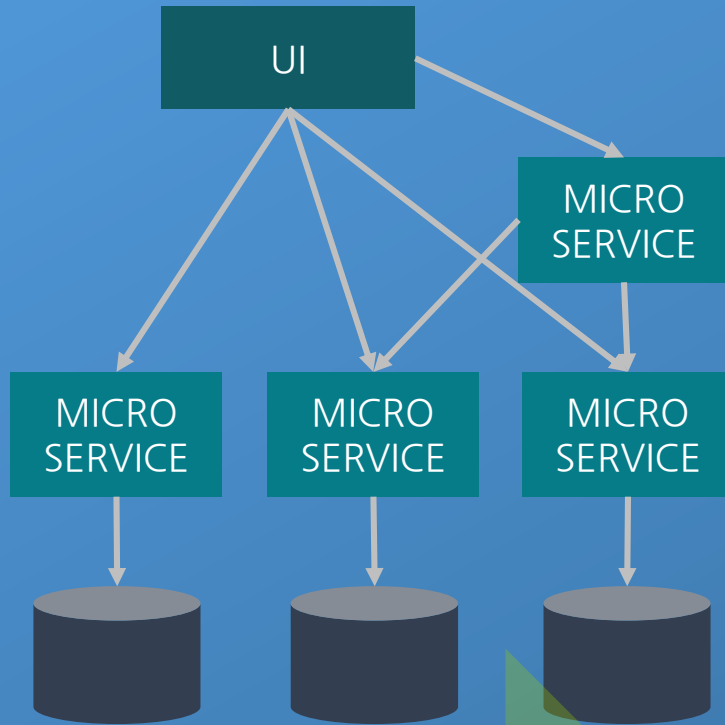
[Docker based] Container Architecture



Monolithic vs Microservice



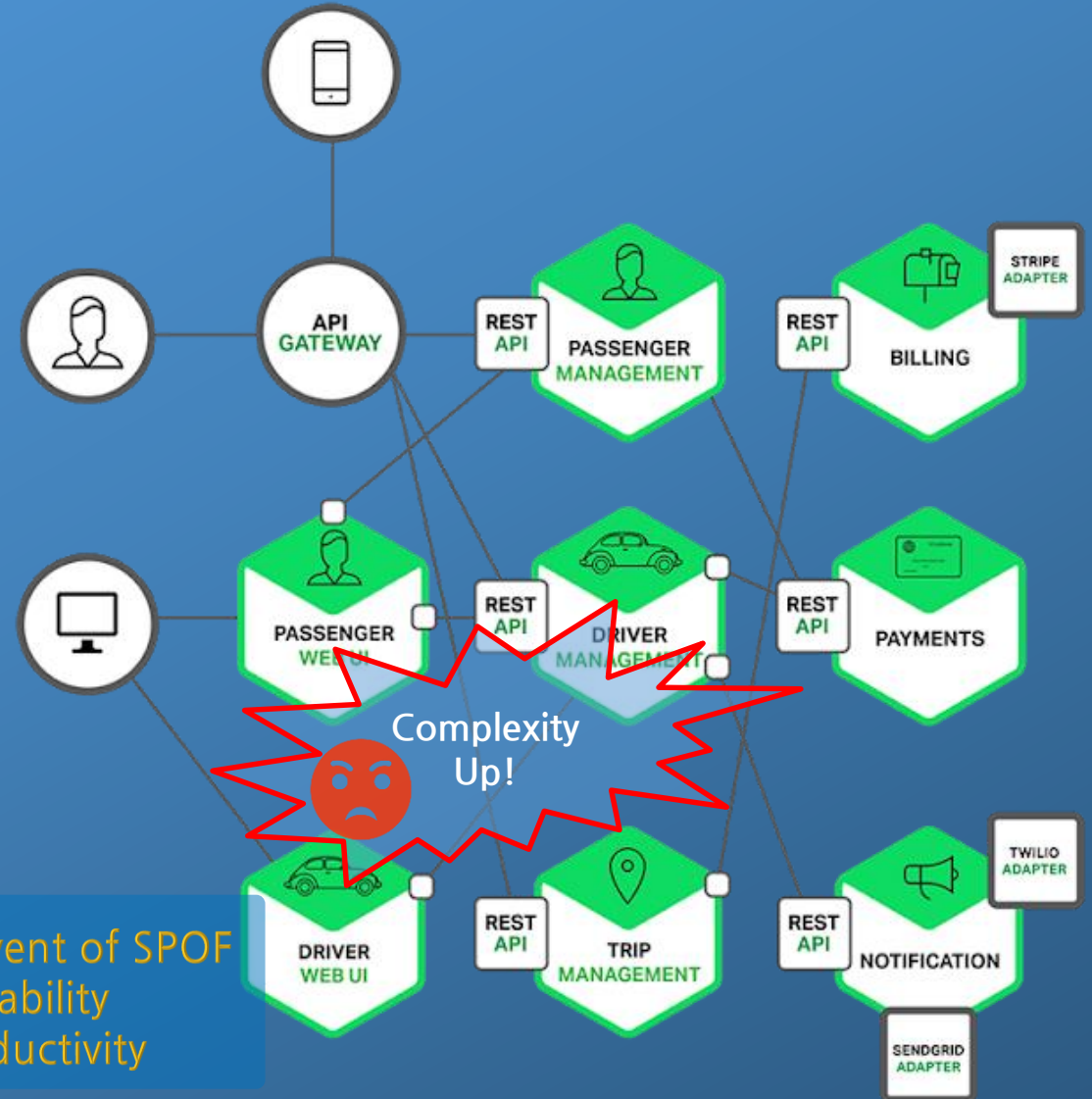
Monolithic



Microservice



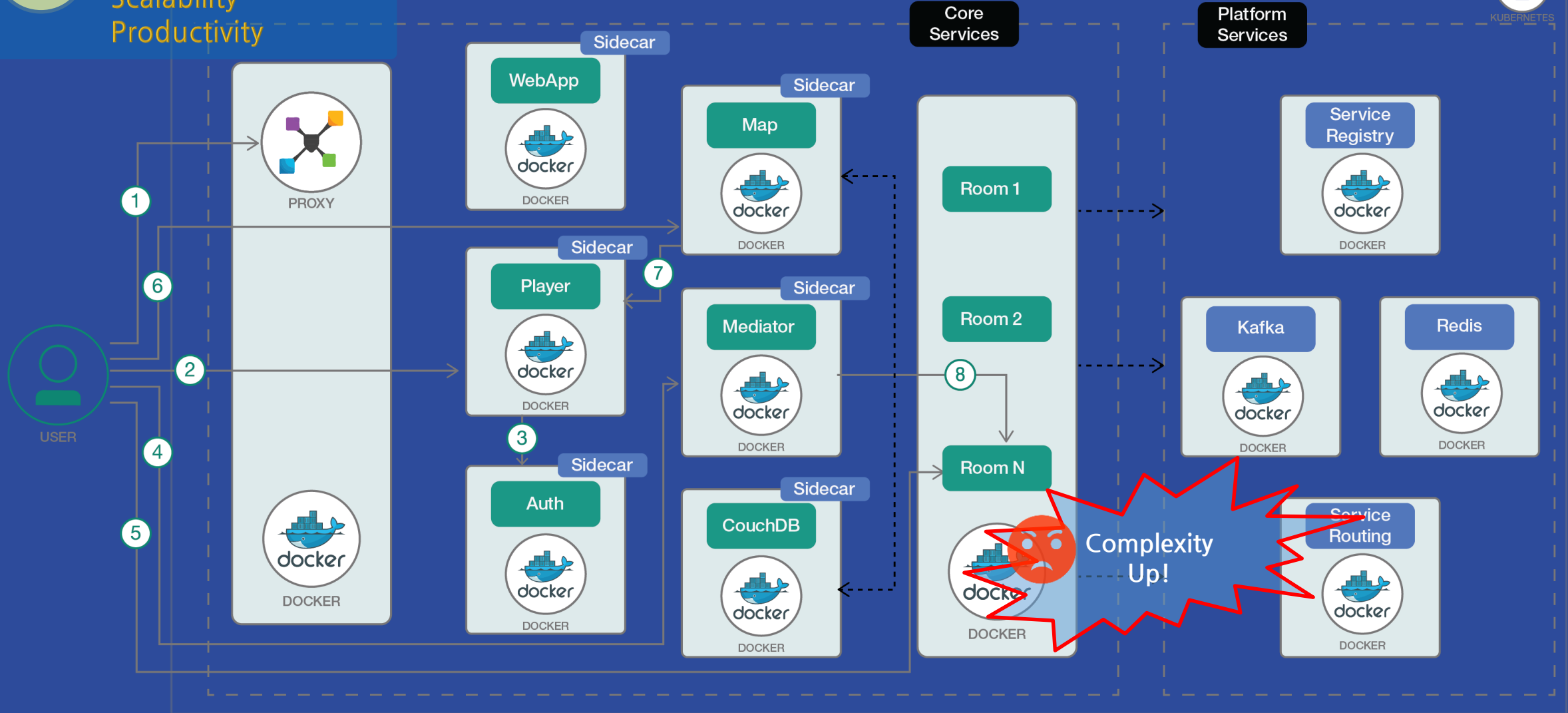
Prevent of SPOF
Scalability
Productivity



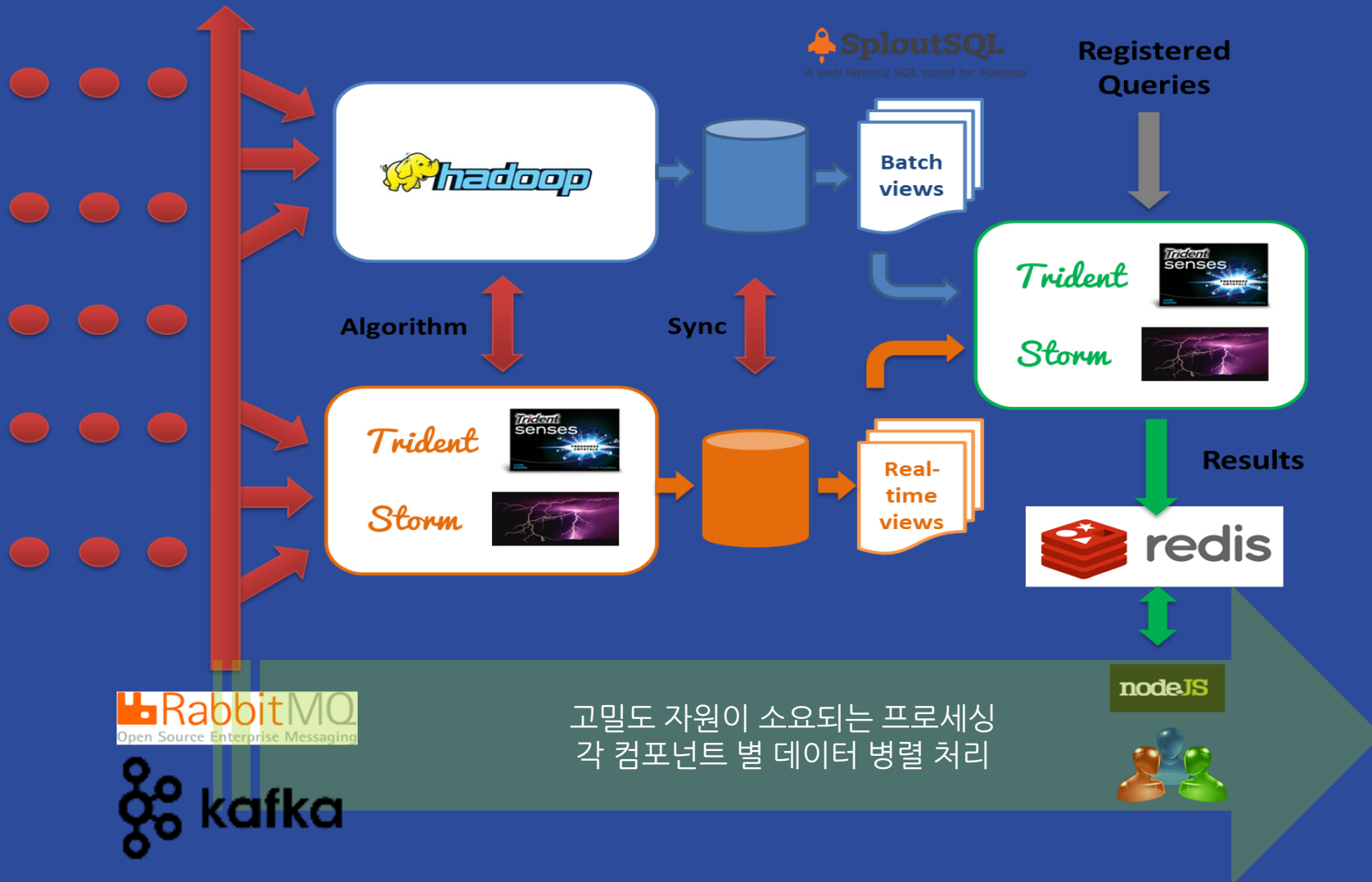
Microservice on K8s



Prevent of SPOF
Scalability
Productivity



Microservice - BigData Lambda Architecture

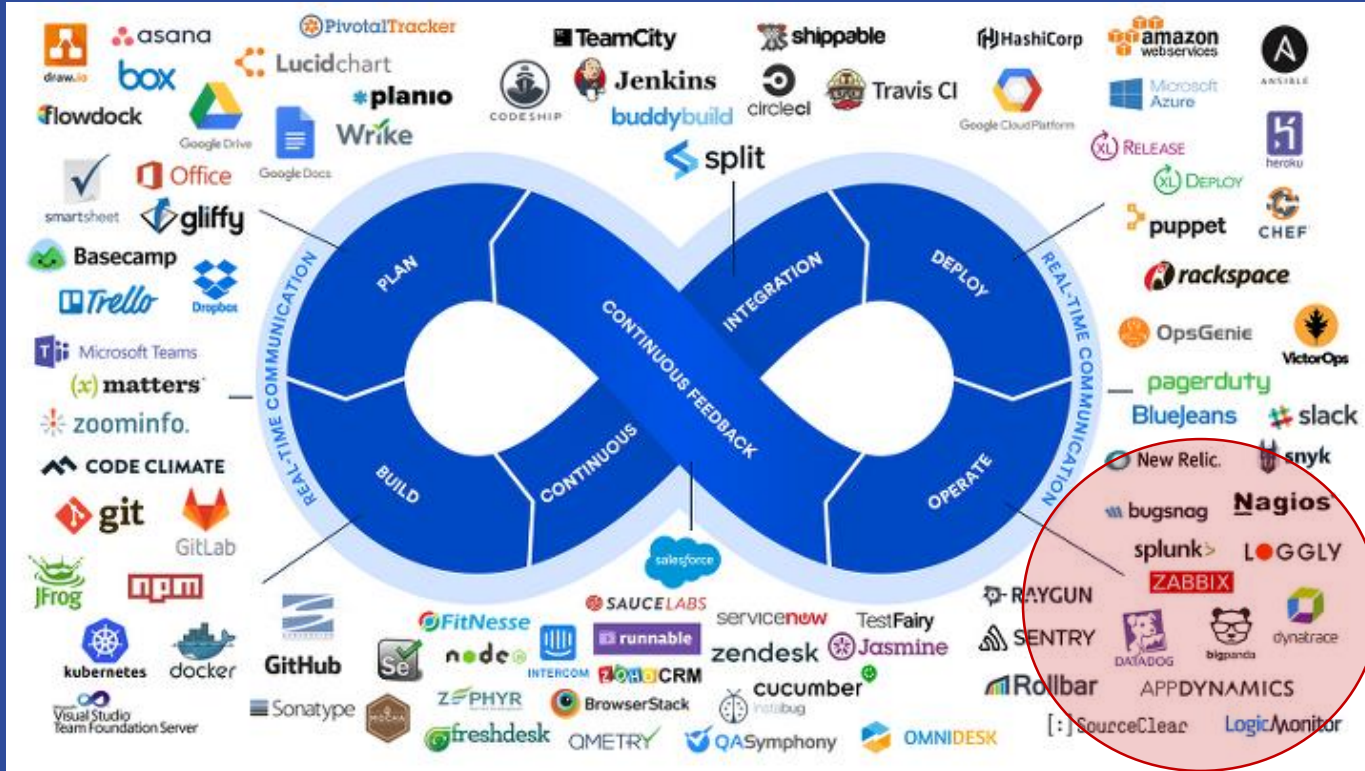


- ▶ BigData 처리를 위한 대표적 시스템
- ▶ 효율적이며 확장에 용이하도록, 배치 프로세싱 레이어와 실시간 프로세싱 레이어 그리고 이 두 레이어를 병합하여 사용자에게 결과값을 제공하는 서버 레이어로 나누어 처리

각 컴포넌트에 특화된 자원 사용율에 대한 지속적 통합 가시성 필요!

고밀도 자원이 소요되는 프로세싱 각 컴포넌트 별 데이터 병렬 처리

DevOps



Monitoring
Logging

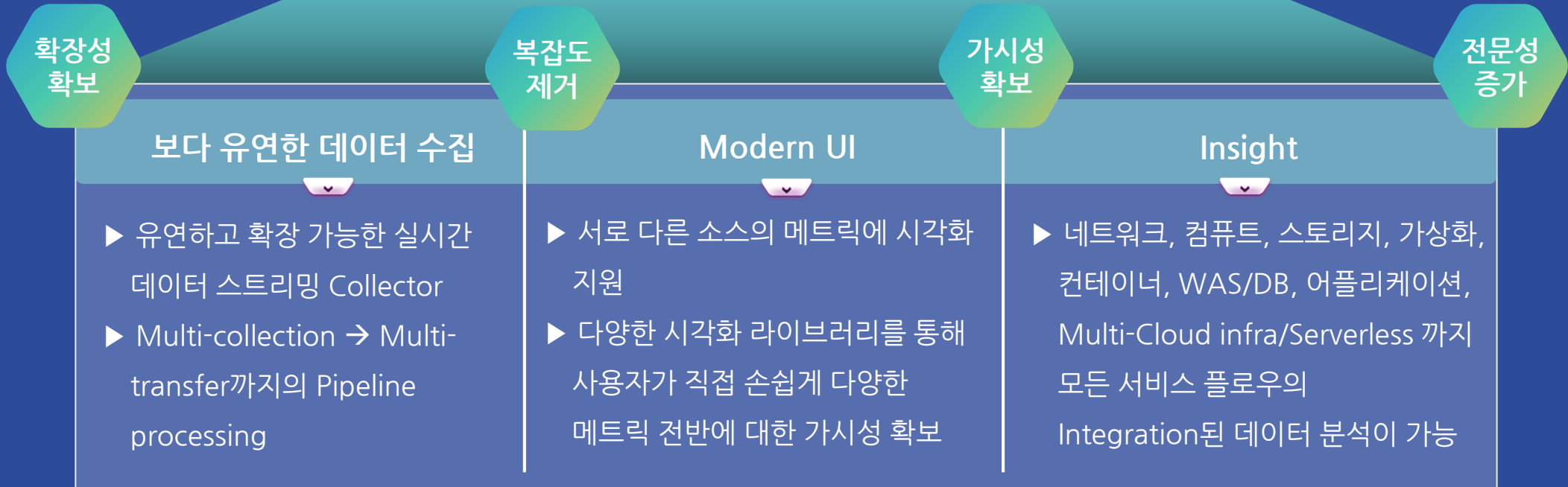
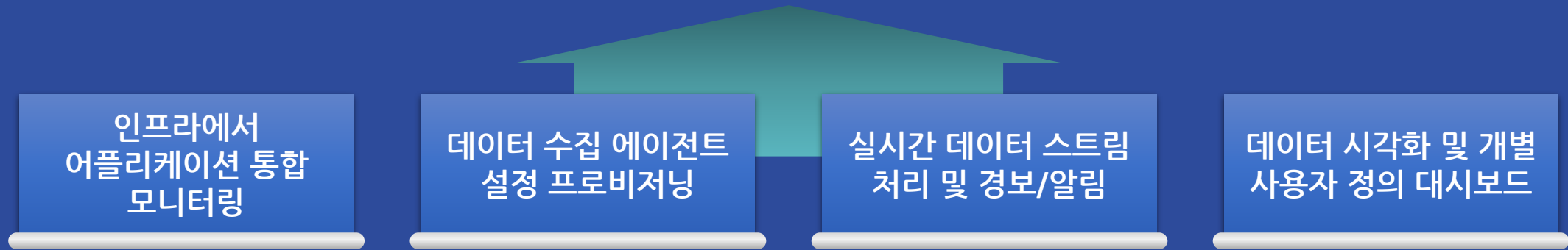


DevOps 팀은 계획, 개발, 통합 및 테스트, 배포, 운영부터 전체 개발 수명 주기를 모니터링

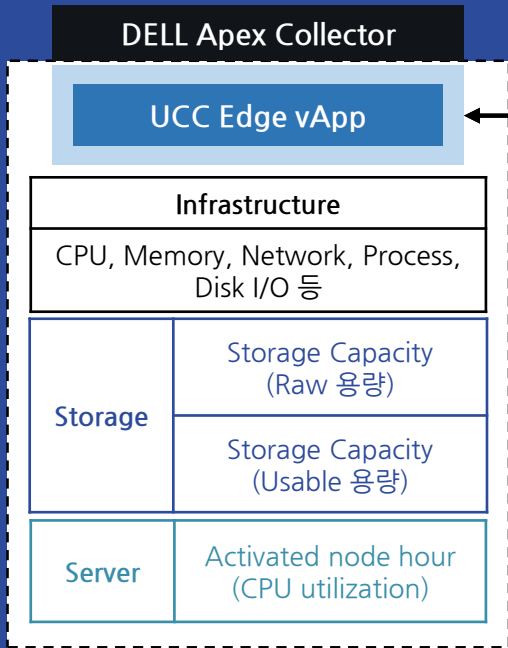
Continuous 통합 Full Stack Monitoring을 위한 가시성이 필요



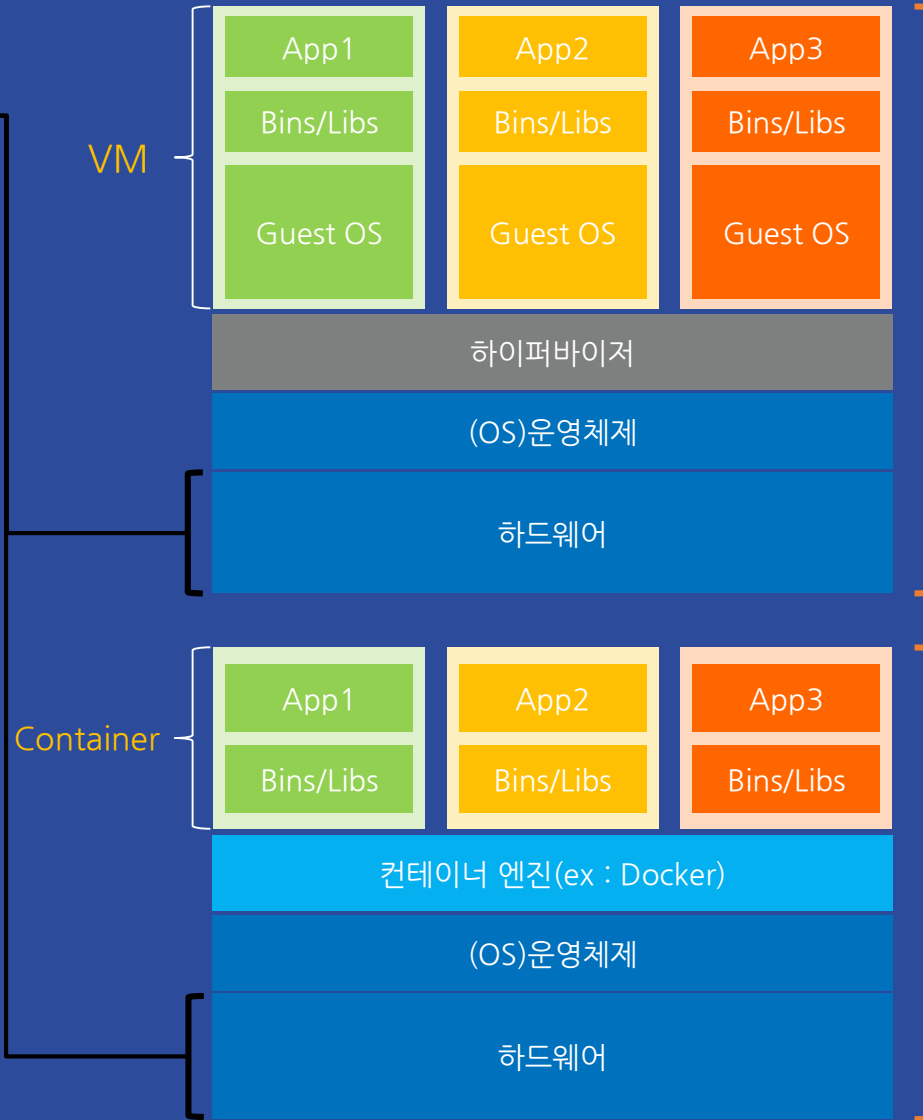
“ 엔터프라이즈, 클라우드 및 하이브리드 어플리케이션 실시간 모니터링 솔루션 - CloudHub ”



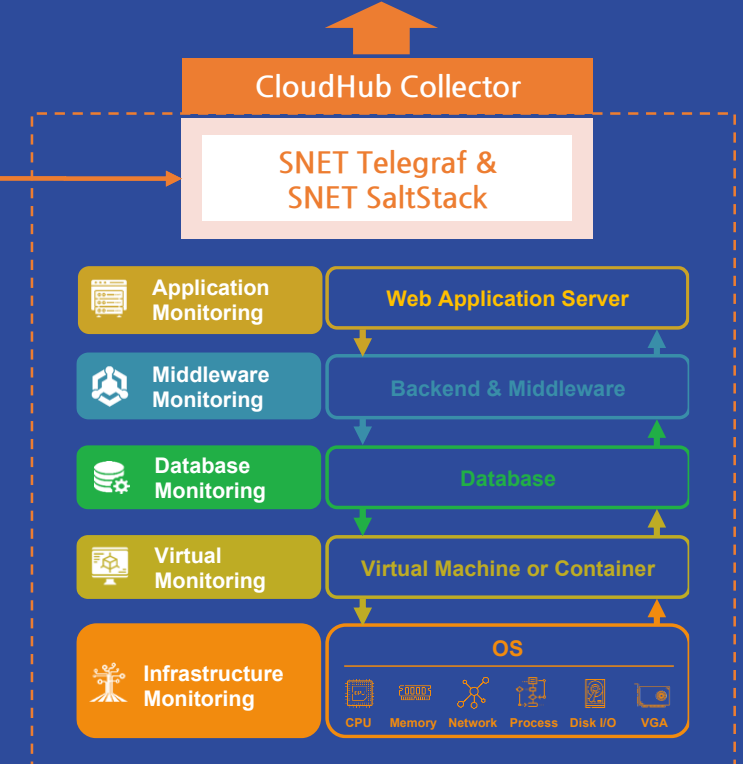
APEX Flex on Demand & CloudHub Monitoring Role



- 1 인프라 구성 요소 및 작업 모니터링
- 2 클라우드 및 인프라 비용 최적화 방법 파악
- 3 고객 INVOICE 발행



- 1 물리적 인프라에서 어플리케이션까지 통합 모니터링
- 2 데이터 수집 에이전트 컨피그 프로비저닝
- 3 실시간 데이터 스트림 처리 및 경보/알림
- 4 데이터 시각화 & 개별 사용자 정의 대시보드

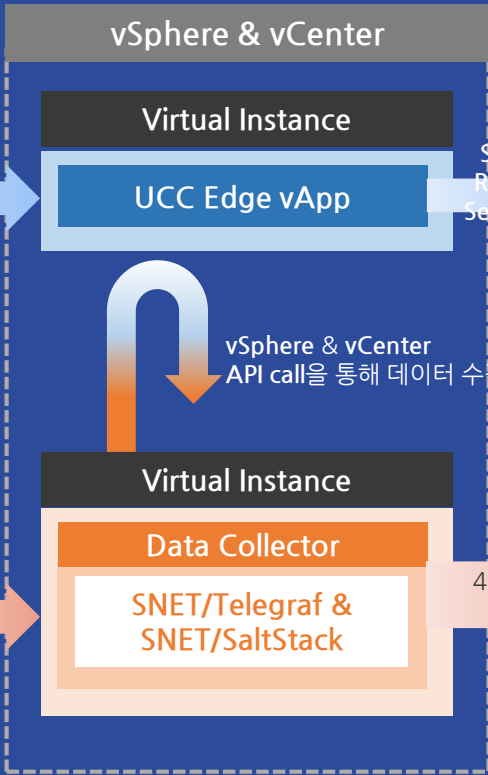


CLOUDHUB UCC Edge App + CloudHub 데이터 수집 구성도 예



DELL Assets

각 assets가 제공하는 표준 수집 방법을 통해, 각 assets에 특화된 데이터 수집.



4505~68086

Public API 제공시 CloudHub에서 모니터링 가능

CLOUDHUB CloudHub Server & Portal

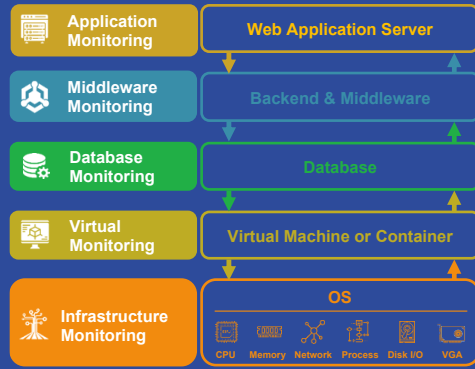
Agent Manager

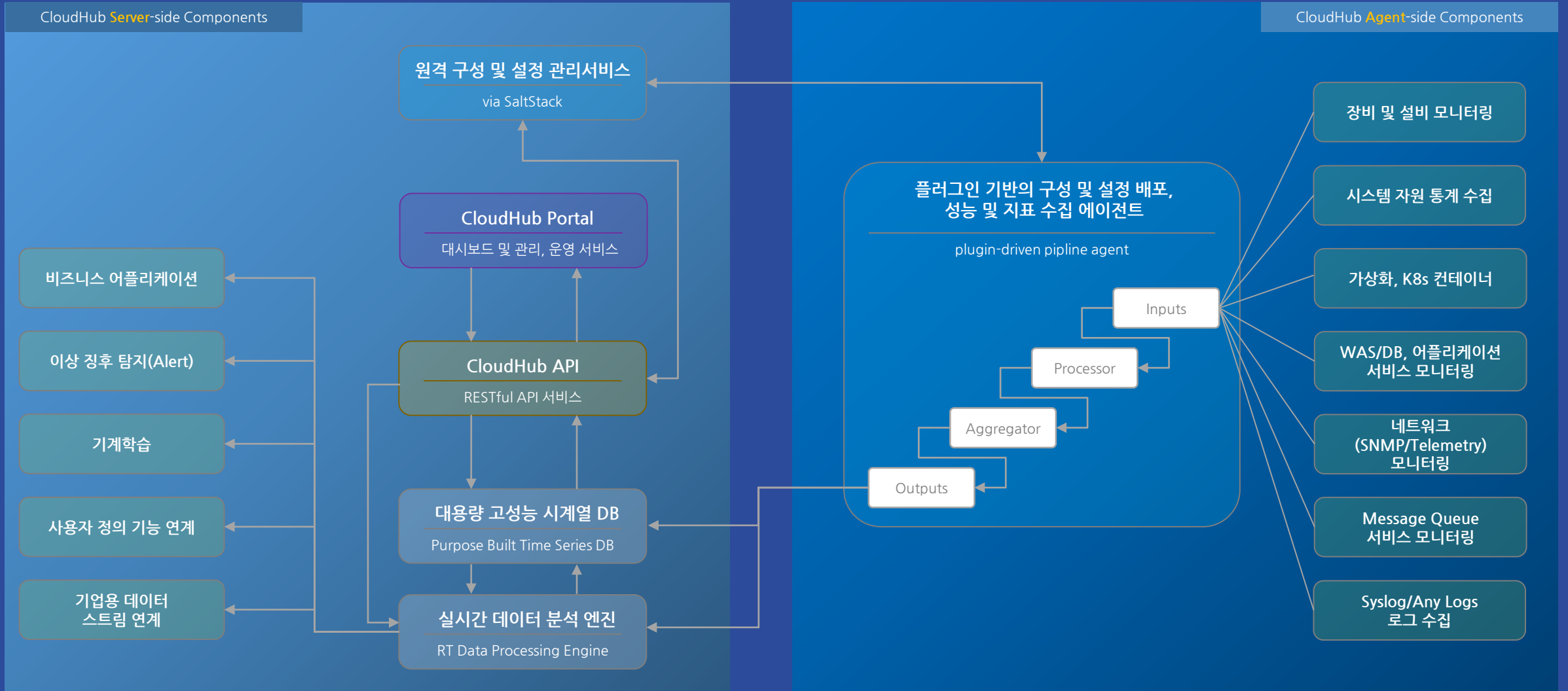
통합 Monitoring Dashboard

Dashboard

통합 관제

- DELL Custom Assets에서 수집한 데이터 관제.
- VM 이나 서버 내에서 동작하는 각종 어플리케이션 관제.
- UCC Edge vApp 관제.



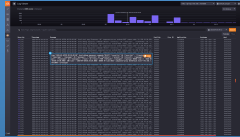


CLOUDHUB Monitoring Stack

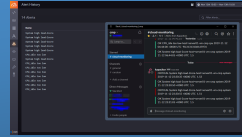
통합 대시보드



로그 뷰어



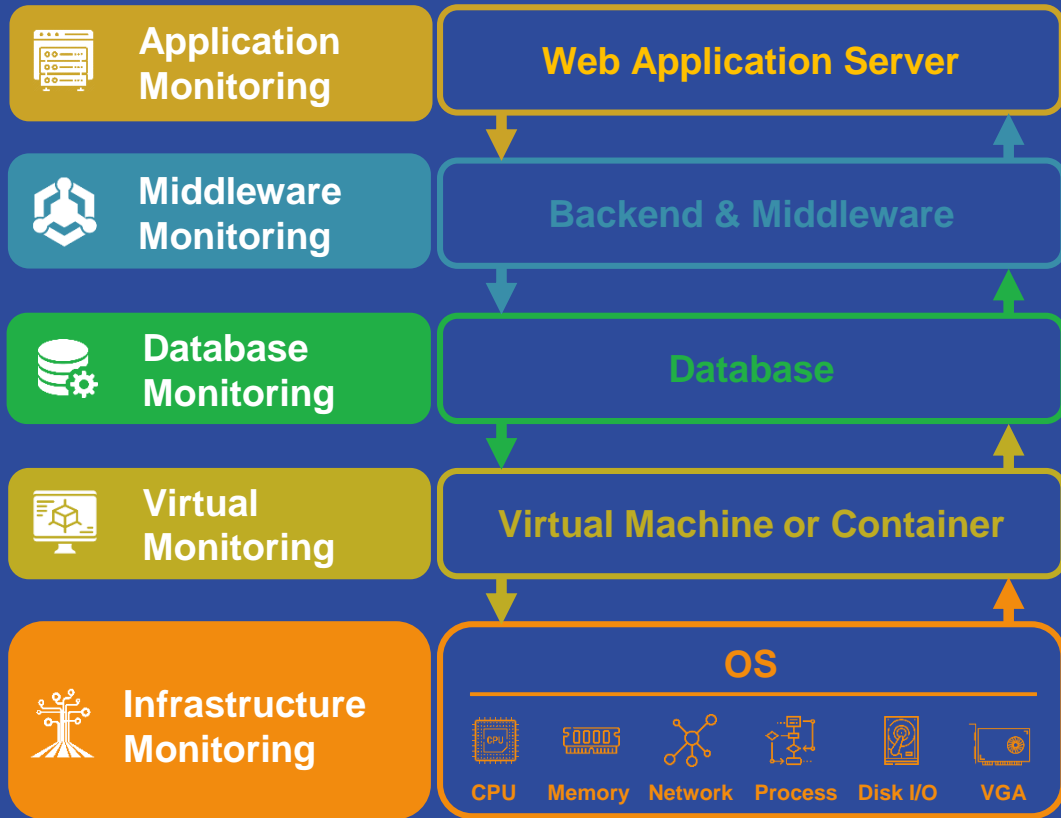
알림(장애, 성능)



수집 에이전트 관리



모바일 웹 지원



NGINX Microsoft IIS APACHE Apache Tomcat VARNISH CACHE

RabbitMQ kafka MQTT logstash APACHE ZooKeeper

hadoop Amazon Kinesis APACHE ACTIVEMQ BIND unbound

ORACLE MySQL influxdb Couchbase CouchDB CASSANDRA

Consul HashiCorp mongoDB PostgreSQL Microsoft SQL Server redis elasticsearch

AEROSPIKE

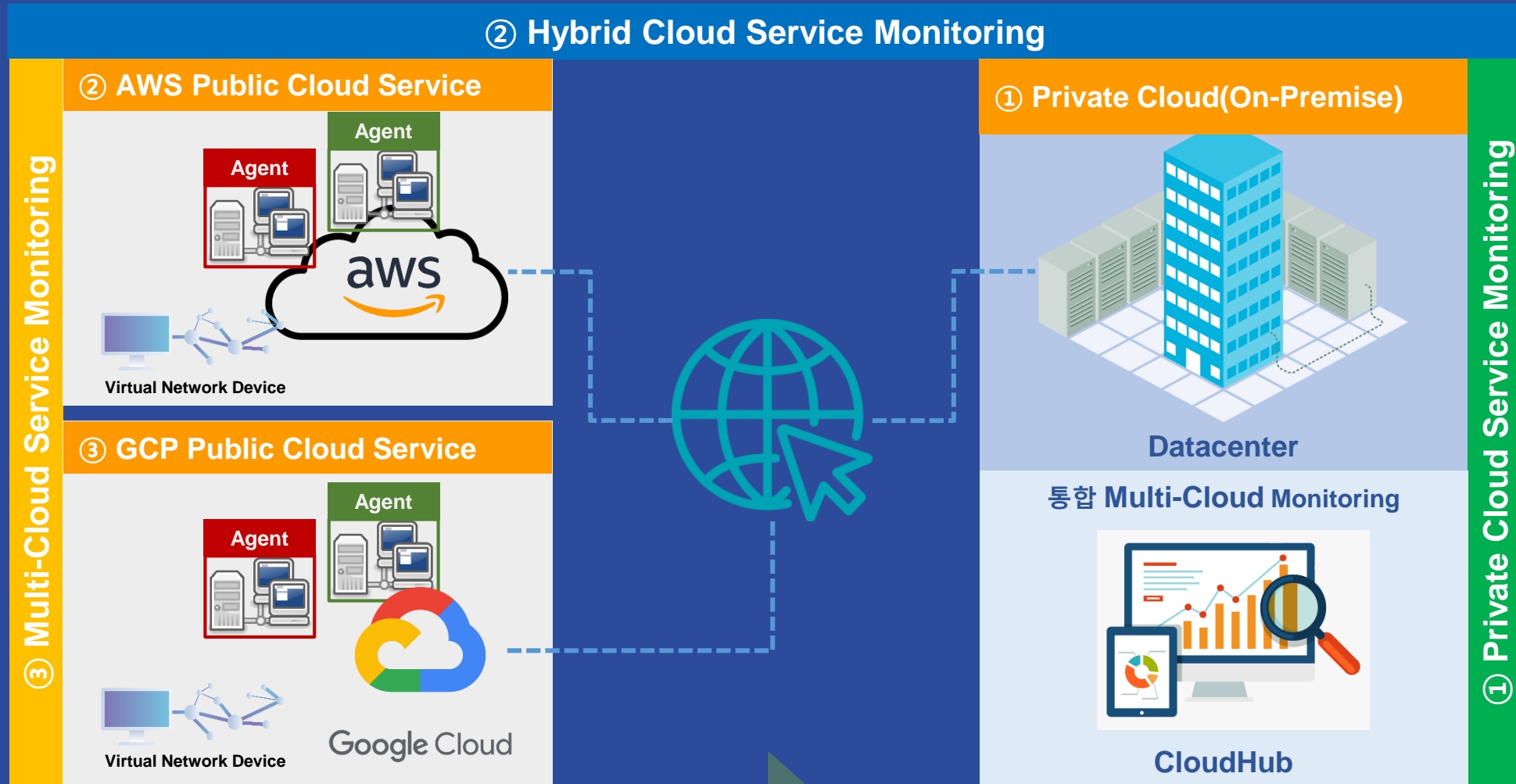
KVM vmware MESOS docker kubernetes

ceph OpenZFS lustre

Windows Red Hat fedora CentOS debian ubuntu

CISCO JUNIPER NETWORKS DELL hp NVIDIA

CLOUDBUB Private, Hybrid, Multi-Cloud Monitoring



AWS, GCP, MS Azure 등에서 운영되는 Native App.

OpenStack+K8s 등으로 구성된 Private Cloud Native App까지 **Tenant** 별 통합 관제 모니터링

CLOUDHUB 주요 특징

01 물리적 인프라에서 어플리케이션까지 통합 모니터링
기본 제공(built-in)된 개별 대시보드를 통해 모든 호스트 부터 어플리케이션까지의 실시간 상태를 시각화

02 데이터 수집 에이전트 Configuration Automation
각 호스트별 어플리케이션 모니터링 Metric 설정을 위하여 중앙 집중식 수집 에이전트(Agent) 설정 관리 기능 제공

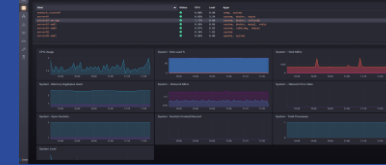
03 실시간 데이터 스트림 처리 및 경보/알림
Threshold, Relative, System Outage 에 대한 다양한 조건의 Alert 규칙 처리 및 3rd party push system에 전송

04 데이터 시각화 & 개별 사용자 정의 대시보드
주요 관심 사항에 대한 모니터링에 보다 집중할 수 있게, SQL-Like 쿼리 빌드 및 사용자 별 대시보드를 빌드

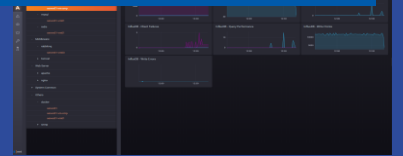
05 Muti-tenant 환경지원
사용자 역할, 권한 및 조직 별 Dashboard 제공



Infra(Network, Server)



DB, Middleware, WEB APP



VM(KVM), Container(Docker)



K8S



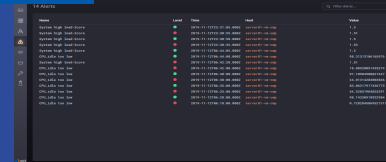
Hybrid Cloud



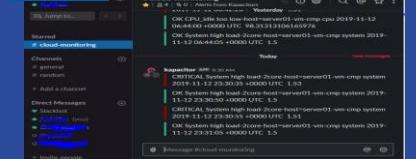
Collector Configure



Alert



Log



Dashboard



Correlation 통합 Dashboard



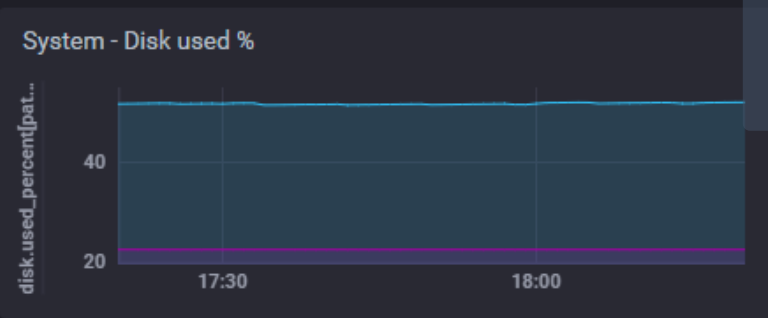
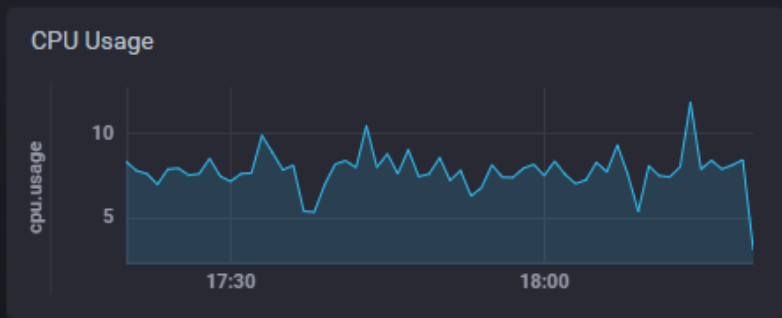


Host Aws

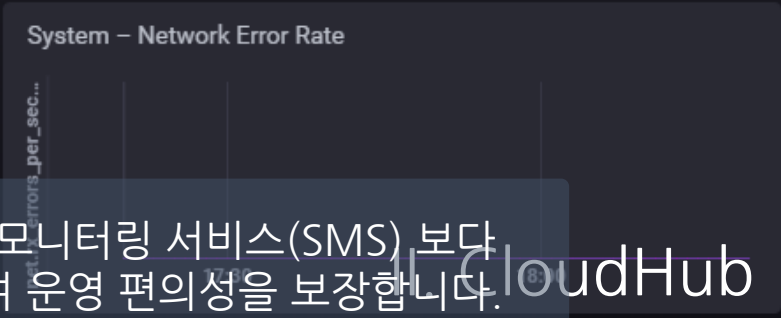
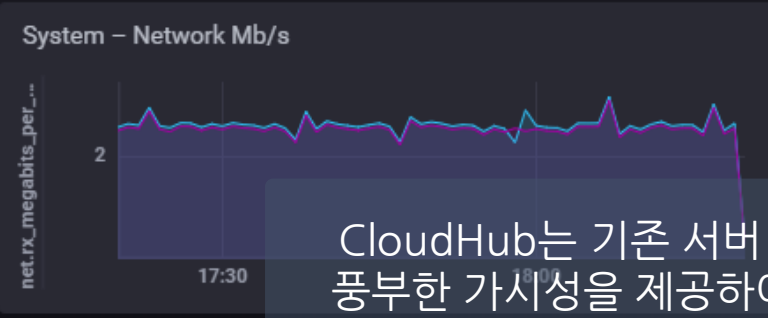
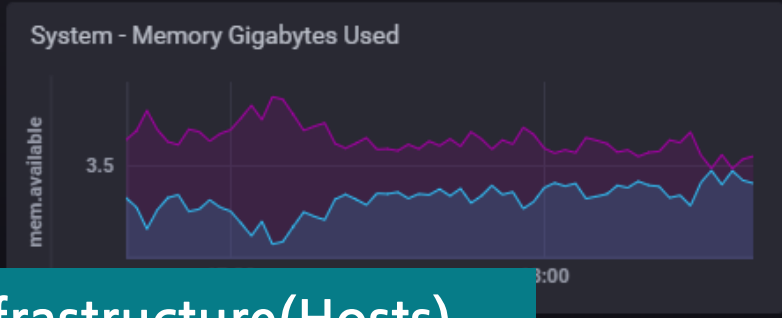
Filter by Host...

Host	Status	CPU	Load	Apps
k8s-master01	●	5.55%	0.62	cloudwatch_elb, cloudwatch, system, docker, influxdb, kubernetes, vsphere
k8s-worker01	●	0.59%	0.18	system, docker, kubernetes
k8s-worker02	●	0.39%	0.02	system, docker, kubernetes
snet-DB_Server	●	0.01%	0.00	system
snet-NCU_Analysis_Server	●	0.00%	N/A	system, win_system
snet-NCU_Web_Server	●	0.02%	0.00	system
snet-SaaS_Portal_WebServer	●	0.00%	0.00	system
snet-bastion	●	0.03%	0.00	system

CloudHub는 호스트 상태와 자원 현황, 운영 서비스 정보를 제공하며, 직관적인 실시간 트렌드 정보를 제공합니다.



CloudHub는 호스트의 물리적 자원 현황과 네트워크 사용현황, 소켓, 프로세스상태 등 서비스 모니터링이 가능합니다.



CloudHub는 기존 서버 모니터링 서비스(SMS) 보다 풍부한 가시성을 제공하여 운영 편의성을 보장합니다.

Infrastructure(Hosts)

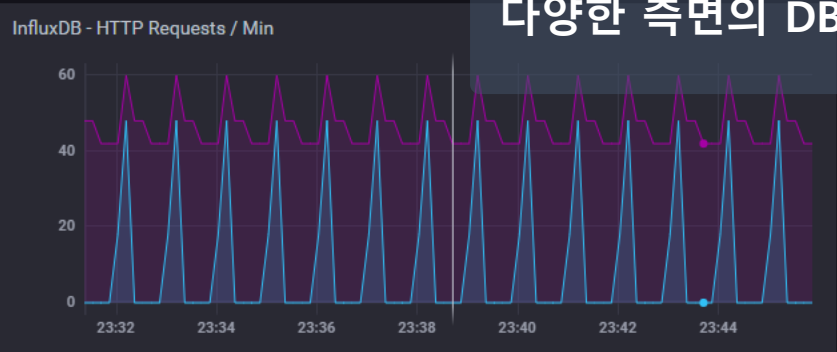
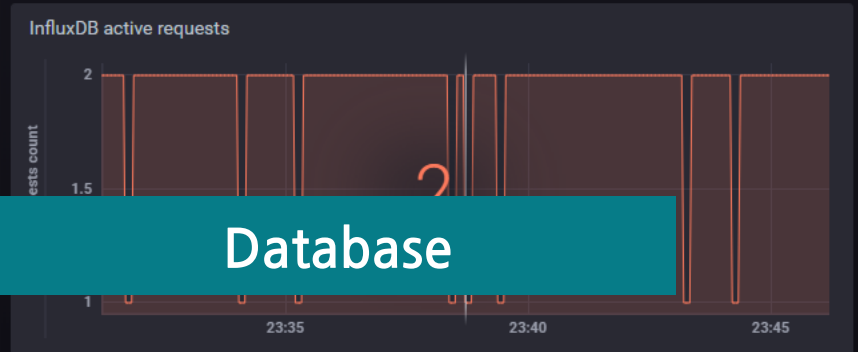
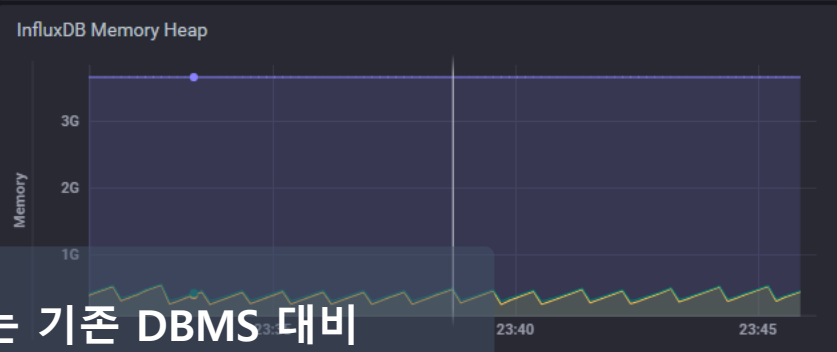
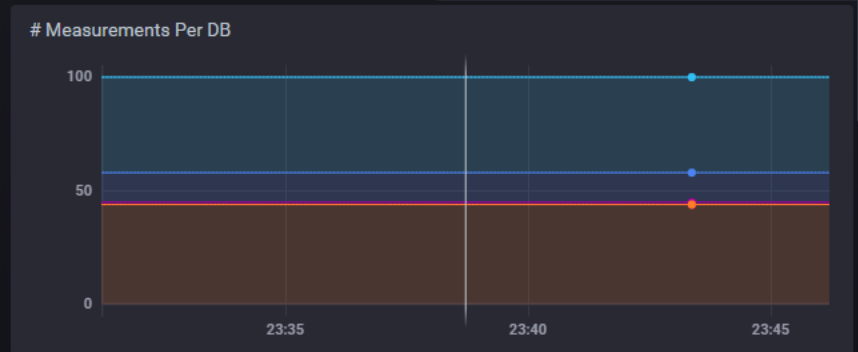
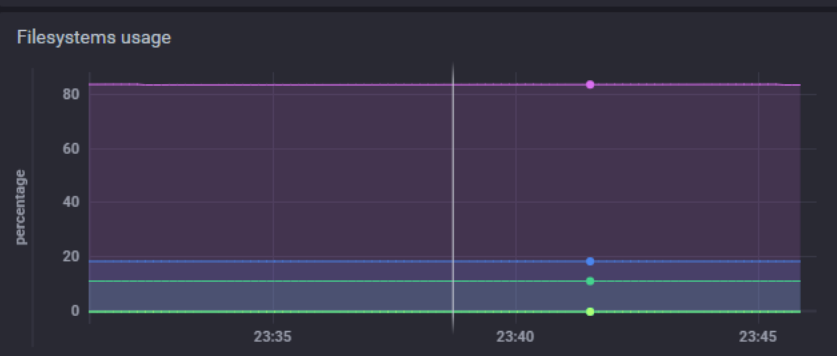
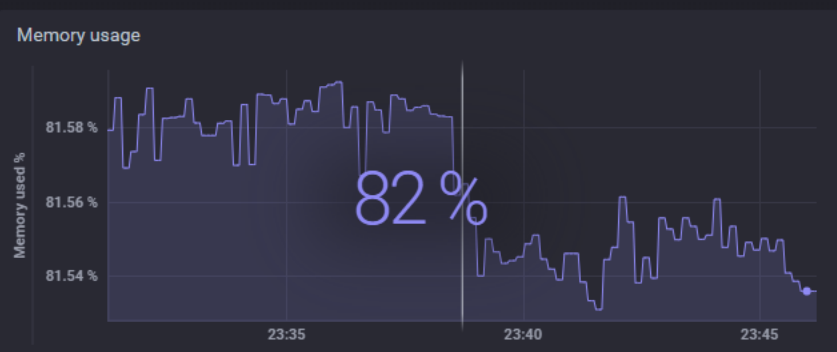
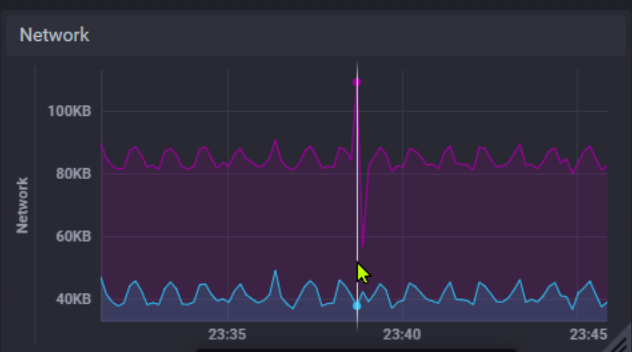
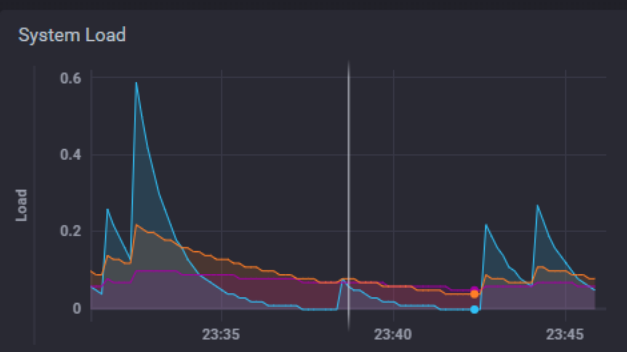
CloudHub

System Uptime
64.44 days

nCPU
2

Measurements
44

Series
1,418



CloudHub는 DB 호스트시스템의 자원 현황과 서비스 운영 정보를 함께 제공하며, 직관적인 DB 모니터링 지표를 제공합니다.

CloudHub는 심층적인 DB 운영상태를 트렌드하게 제공합니다.
(Active Req. / HTTP Req/Min 등)

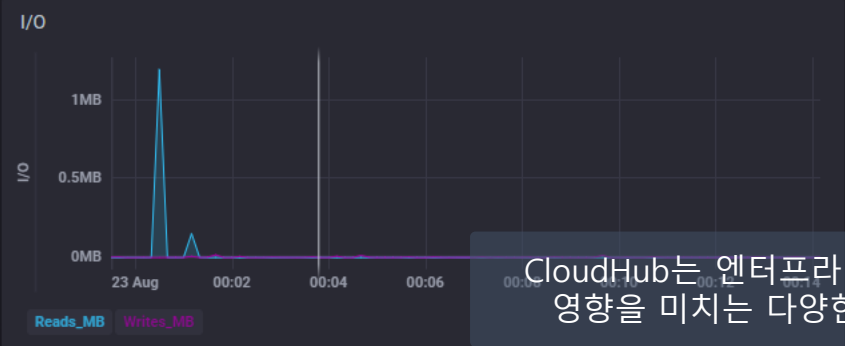
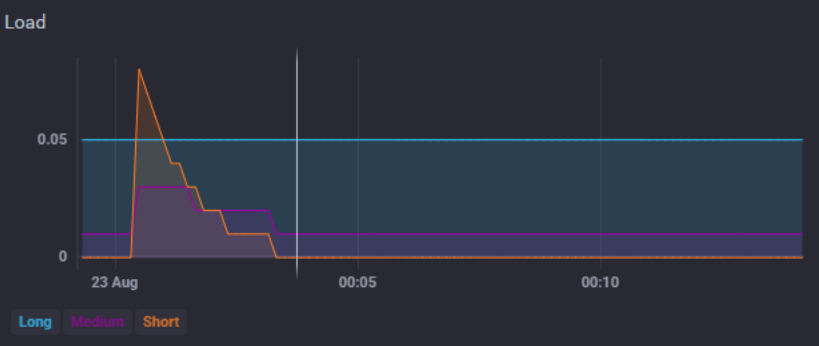
CloudHub 는 기존 DBMS 대비 다양한 측면의 DB 운영방안을 제시합니다.

Database

System Uptime
222.61 d

CPUs
4

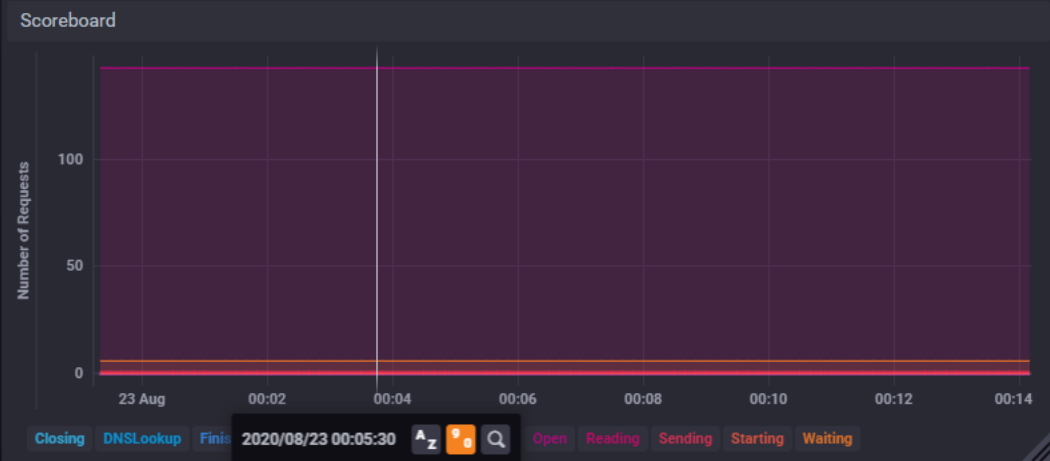
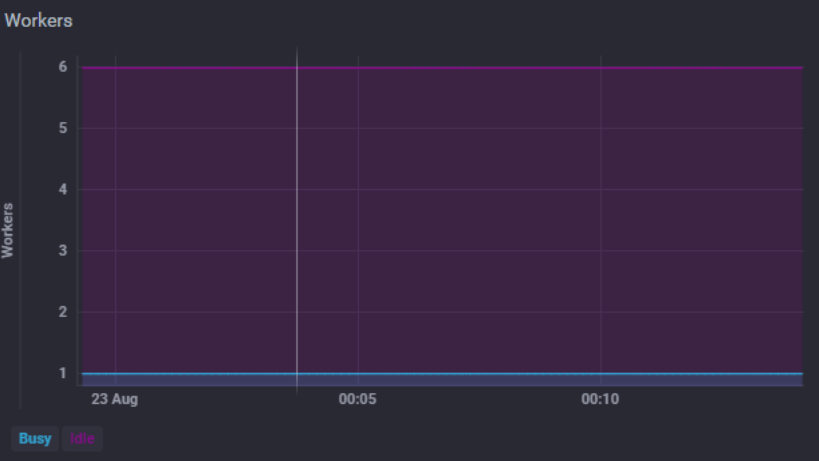
RAM
4 GB



Network

To enable this graph, you will need to configure the [Telegraf net](#) plugin. For more information, please visit the [Telegraf Net plugin documentation](#).

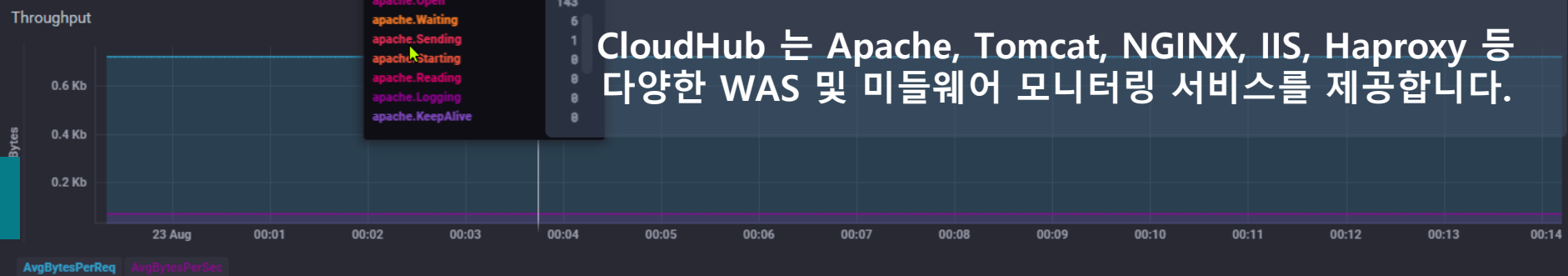
CloudHub는 엔터프라이즈 웹어플리케이션서비스 운영에 영향을 미치는 다양한 요소들을 수집하고 분석합니다.



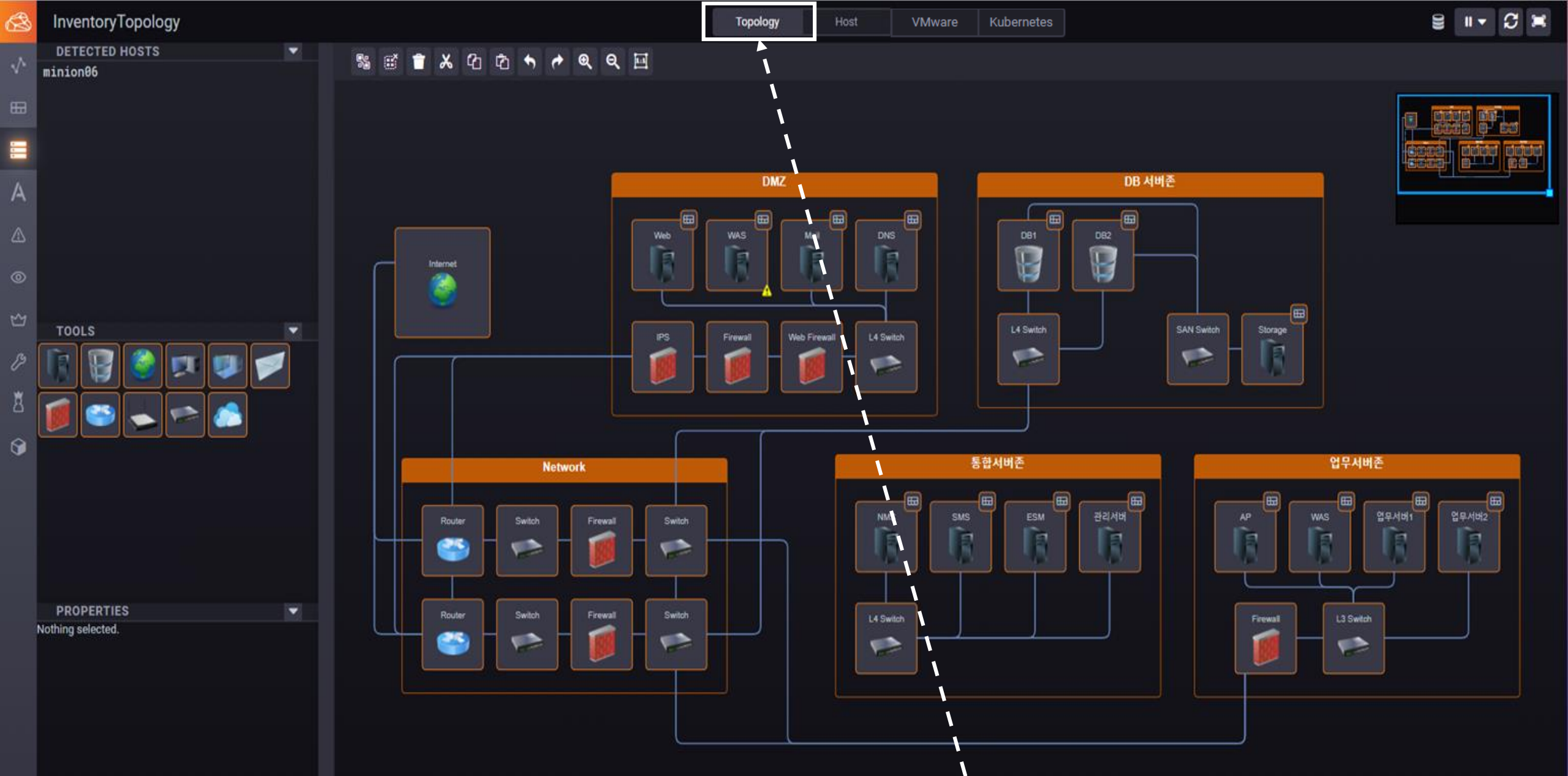
Apache Uptime
3,805.4 h

CPU Load
0.02

Requests Per Sec
0.1 r/s
WAS



CloudHub 는 Apache, Tomcat, NGINX, IIS, Haproxy 등 다양한 WAS 및 미들웨어 모니터링 서비스를 제공합니다.



Topology

사용자 정의 토폴로지 맵 authoring 기능으로 Inventory에 대한 구성을 시각화 하며, 기(既) 생성된 대시보드로 연결(link) 할 수 있습니다.



VMWARE INVENTORY

+ Add vCenter

Filter by Name...

61.250.122.234

Five_Senses_Lab

61.250.122.235

61.250.122.121

[sw2]vm_centos

[SW1]122.220_XV2_COL1

[sw1]122.173

[sw1]99.203(Oracle)

helloinstall

[sw2]Han-Test-2

[sw2]Han-Test-1

MySQL1

MariaDB_3

[sw1]122.172

[SW1]122.221_XV2_COL2

MariaDB_2

[sw1]122.171

[sw1] MariaDB_1

61.250.122.231

[SW2]TechLabTensor

[SW1]122.151_Lic_KeyBox

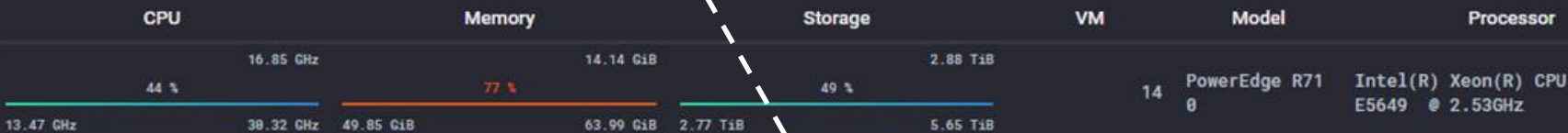
S-NMP

[sw1]122.223_XV2_DB_223

VMWare

[SW1]61.250.122.224_uready

Host(ESXi) - 61.250.122.121



VMWare Addon 활성화 시, VMWare Inventory 모니터링을 수행합니다.

Charts

CPU Usage (MHz)



Disk Usage



Disk Latency



Memory Usage



Network Usage



Virtual Machine

VM	CPU	CPU core	Memory	Storage	IP	OS	Power Status
[sw2]vm_centos	-	8 EA	-	16.00 GiB	-	Red Hat Enterprise Linux 6 (64-bit)	●
[SW1]122.220_XV2_COL1	10.48 GHz	4 EA	5.68 GiB	107.99 GiB	-	Microsoft Windows Server 2008 R2 (64-bit)	●
[sw1]122.173	2.10 GHz	4 EA	1.28 GiB	156.03 GiB	-	Microsoft Windows Server 2008 R2 (64-bit)	●

kube-flannel-ds-amd64-8zsvj

CPU 18 %

Memory 34 %



DETAILS

Kind Pod

Name **coredns-f9fd979d6-4d4vp**

Details

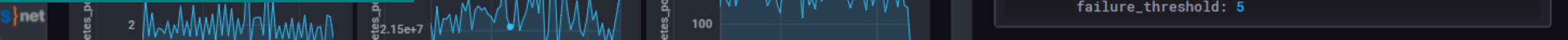
```

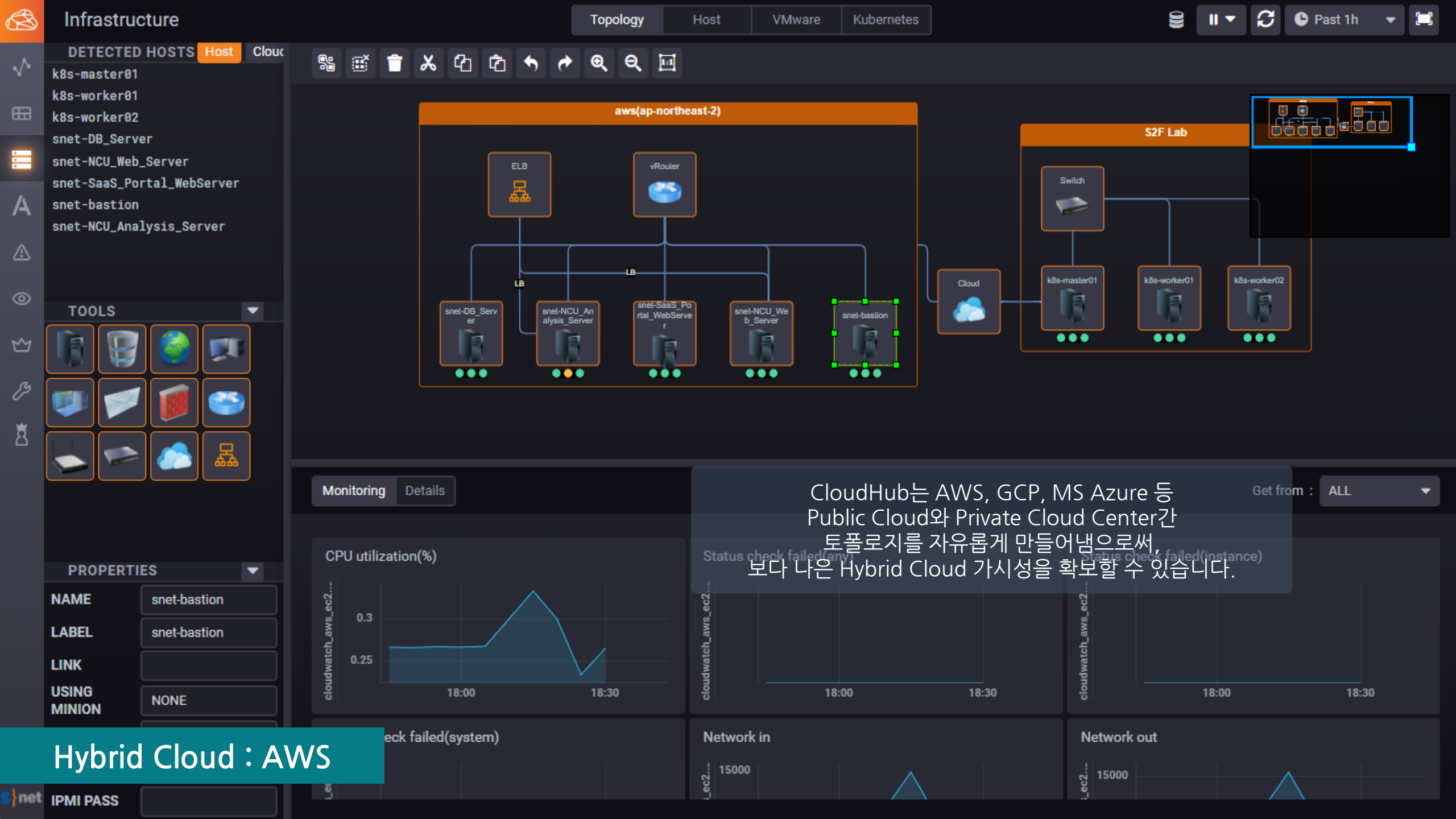
api_version: v1
kind: Pod
metadata:
  creation_timestamp: '2021-11-15T06:11:53.000Z'
  generate_name: coredns-f9fd979d6-
  labels:
    k8s-app: kube-dns
    pod-template-hash: f9fd979d6
  name: coredns-f9fd979d6-4d4vp
  namespace: kube-system
  owner_references:
    - api_version: apps/v1
      block_owner_deletion: true
      controller: true
      kind: ReplicaSet
      name: coredns-f9fd979d6
      uid: 7c7a92a0-249f-45e7-af53-82749fa264ea
  resource_version: '17696606'
  self_link: /api/v1/namespaces/kube-
system/pods/coredns-f9fd979d6-4d4vp
  uid: d7bf0991-1bab-4a3e-8051-67c5a9917473
spec:
  containers:
    - args:
      - '-conf'
      - '/etc/coredns/Corefile'
      image: 'k8s.gcr.io/coredns:1.7.0'
      image_pull_policy: IfNotPresent
      liveness_probe:
        failure_threshold: 5

```

CloudHub는 쿠버네티스 상의 모든 POD 및 Node를 실시간으로 한눈에 관제할 수 있으며, Deployment-ReplicaSet-PODs 간 관계 정보를 손쉽게 관찰할 수 있습니다.

Kubernetes





DETECTED HOSTS Host Cloud

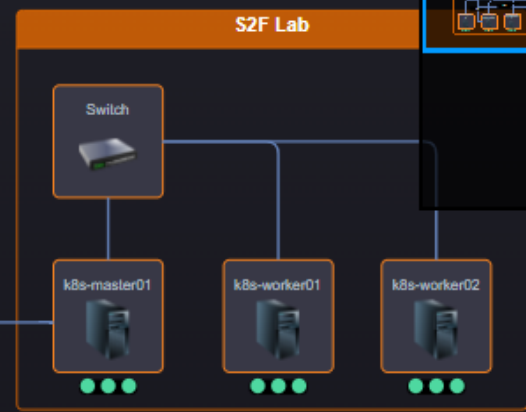
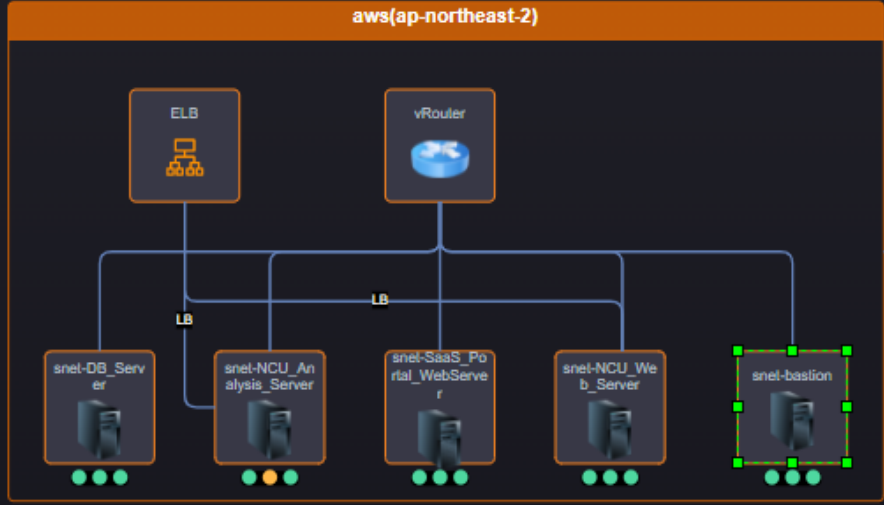
- k8s-master01
- k8s-worker01
- k8s-worker02
- snet-DB_Server
- snet-NCU_Web_Server
- snet-SaaS_Portal_WebServer
- snet-bastion
- snet-NCU_Analysis_Server

TOOLS



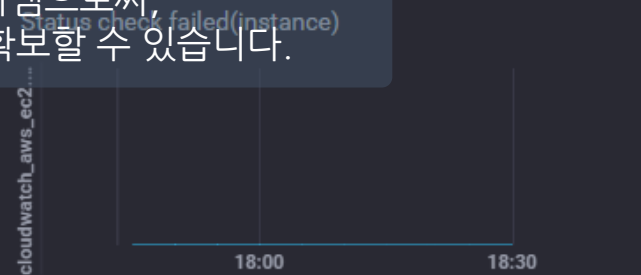
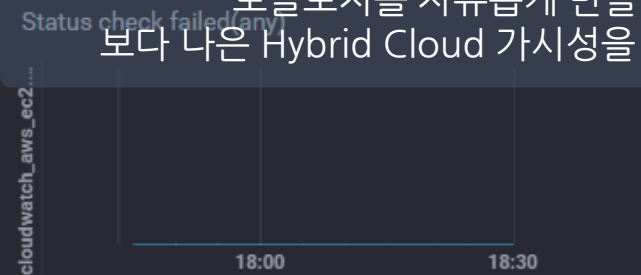
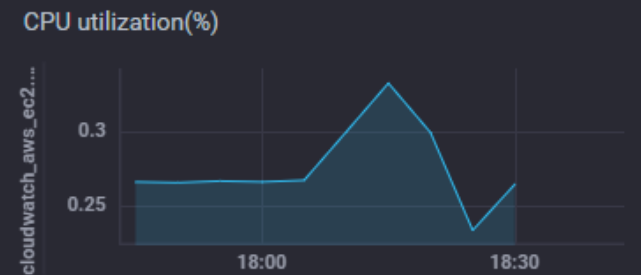
PROPERTIES

NAME	snet-bastion
LABEL	snet-bastion
LINK	
USING MINION	NONE



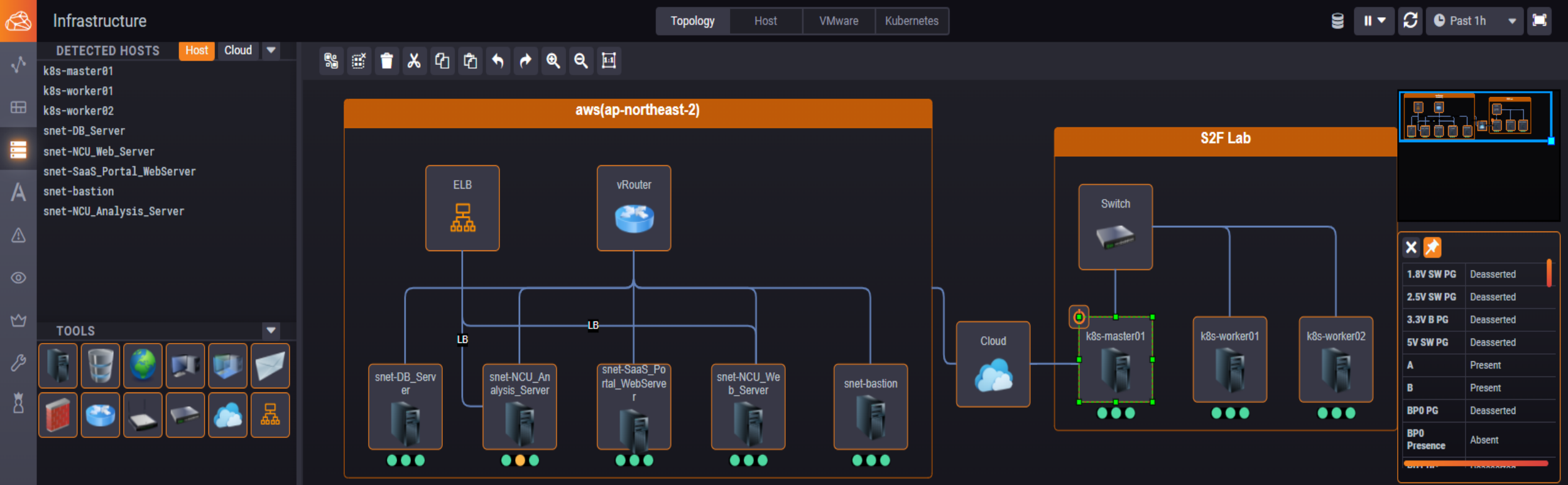
CloudHub는 AWS, GCP, MS Azure 등 Public Cloud와 Private Cloud Center간 토폴로지를 자유롭게 만들어냄으로써, 보다 나은 Hybrid Cloud 가시성을 확보할 수 있습니다.

Monitoring Details

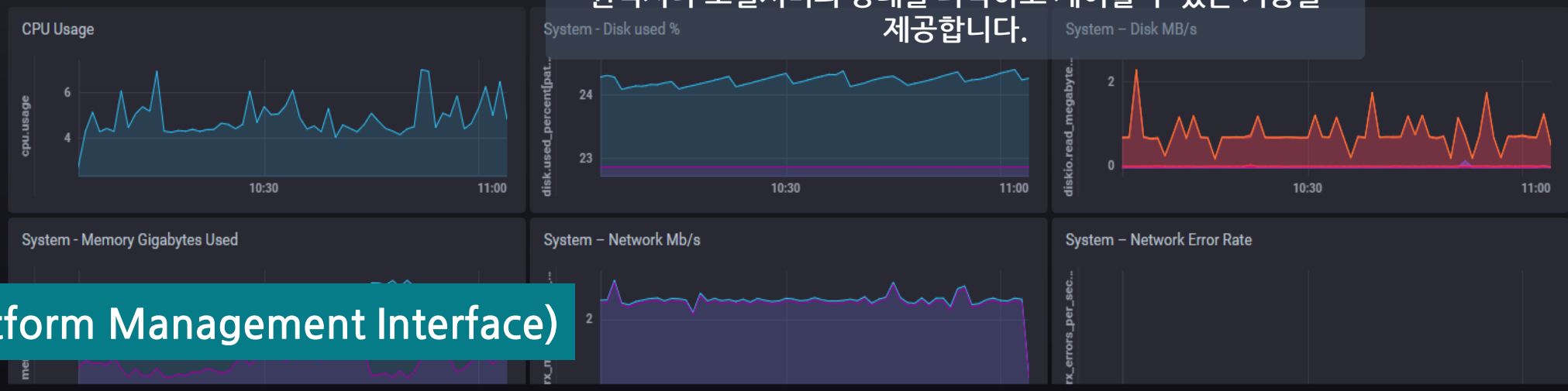


Hybrid Cloud : AWS

IPMI PASS



CloudHub는 Topology Map에서 IPMI 정보를 등록하여 원격지나 로컬서버의 상태를 파악하고 제어할 수 있는 기능을 제공합니다.



IPMI (Intelligent Platform Management Interface)

PROPERTY	VALUE
NAME	k8s-master01
LABEL	k8s-master01
LINK	
USING MINION	k8s-master01
IPMI HOST	[REDACTED]
STATUS	TRUE

Dynamic SourceInfluxQLFlux(Alpha)

사용자가 관심있는 데이터를 쿼리할 수 있는
 쿼리 툴이자 사용자 정의 시각화 툴

```
SELECT mean("cpu_usage_nanocores") AS "mean"
```

```
SELECT mean("cpu_usage_nanocores") AS "mean"
time > :dashboardTime: AND time < :up
```

Success!

2022/03/14 17:08:50

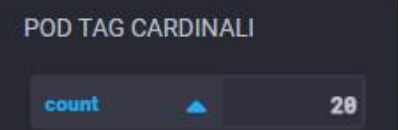
```
kubernetes_pod_container.mean_cpu_usage_nanocores[pod_name=kube-apiserver-
kubernetes_pod_container.mean_cpu_usage_nanocores[pod_name=etcd-k8s-
kubernetes_pod_container.mean_cpu_usage_nanocores[pod_name=kube-com
kubernetes_pod_container.mean_cpu_usage_nanocores[pod_name=ingress-n
kubernetes_pod_container.mean_cpu_usage_nanocores[pod_name=kube-sch
kubernetes_pod_container.mean_cpu_usage_nanocores[pod_name=coredns-f
kubernetes_pod_container.mean_cpu_usage_nanocores[pod_name=kube-flannel-ds-amd64-75wdt]
```

1.99MDB.RetentionPolicyMeasurements & TagsFilterFieldsGroup by:autoCompare:noneFill:nullDefault.autogenRnD.autogen_internal.monitorcloudhub.autogendc - 1host - 3namespace - 4node_name - 3phase - 1pod_name - 20rack - 1Group By pod_namecpu_usage_core_nanosecondscpu_usage_nanocores1 Functionlogsfs_available_byteslogsfs_capacity_byteslogsfs_used_bytesFilter

Visualize - 시각화

Pods Section

This is a section of the visualization of Pods



The number of Pods



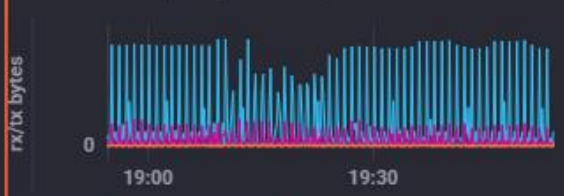
Pods now() - 10m

pod_name	host
coredns-f9fd979d6-	k8s-master01
coredns-f9fd979d6-	k8s-master01
dashboard-metrics-	k8s-master01
default-http-backend-	k8s-worker01
default-http-backend-	k8s-worker01
etcd-k8s-master01	k8s-master01
hostname-deployment-	k8s-worker01
hostname-deployment-	k8s-worker01
ingress-nginx-controller-	k8s-worker01

Nodes Section

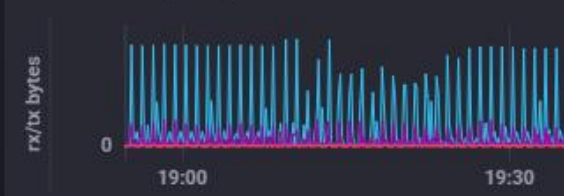
This is a section of the visualization of Nodes

Nodes_traffic(rx/tx) - InfluxQL



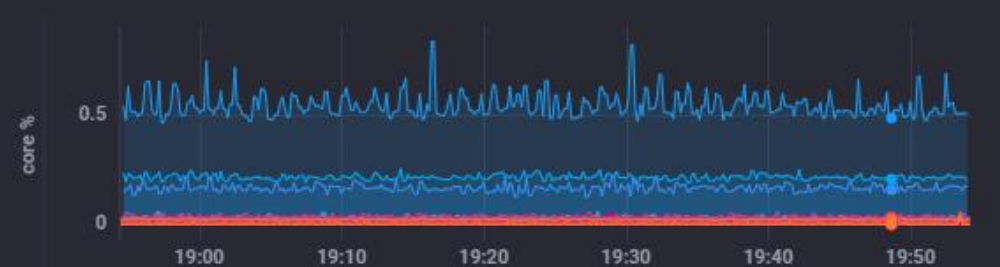
```
rx_bytes[host=k8s-master01]
rx_bytes[host=k8s-worker01]
rx_bytes[host=k8s-worker02]
tx_bytes[host=k8s-master01]
tx_bytes[host=k8s-worker01]
```

Node_traffic(rx/tx) - Flux



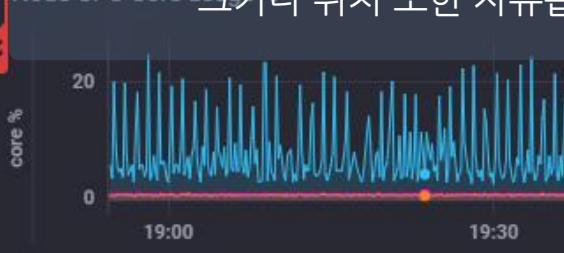
```
027911677Z][_stop=2022-03-14T10:54:22.027911677Z][_field=network_rx_byte
027911677Z][_stop=2022-03-14T10:54:22.027911677Z][_field=network_rx_byte
027911677Z][_stop=2022-03-14T10:54:22.027911677Z][_field=network_rx_byte
```

Pods_cpu_usage_cores: Linear scale - InfluxQL

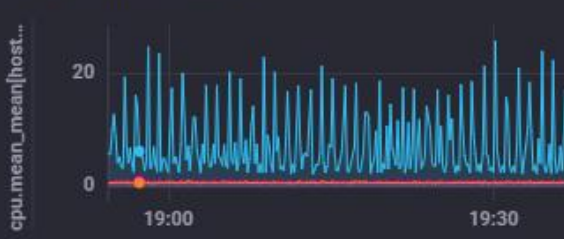


```
mean_cpu_usage_nanocores[host=k8s-master01][namespace=kube-system][pod_name=coredns-f9fd9
mean_cpu_usage_nanocores[host=k8s-master01][namespace=kube-system][pod_name=kube-apiserve
mean_cpu_usage_nanocores[host=k8s-master01][namespace=kube-system][pod_name=kube-controllie
```

Node CPU Core usage



Bare-metal CPU Usage



Allocatable resources



Memory usage for Nodes



K8s System Container Section

사용자 정의 대시보드를 생성하거나, 시각화 틀을 통해 생성된 차트를 기존의 대시보드에 삽입 가능. 크기나 위치 또한 자유롭게 배치 가능.

Custom Dashboard - K8s(Kubernetes)

Manage Tasks on Kapacitor1 @ http://kapacitor:9094/

5 Alert Rules

Name	Rule Type	Message	Alert Handlers	Task Enabled
CPU_idle too low	Threshold	{{.Level}} {{.ID}} {{.Name}} {{.Tim...	slack (default)	<input checked="" type="checkbox"/>
System Dead	Deadman	{{.Level}} {{.ID}} {{.Name}} {{.Tim...	slack (default)	<input checked="" type="checkbox"/>
System high load-2core	Threshold	{{.Level}} {{.ID}} {{.Name}} {{.Tim...	slack (default)	<input checked="" type="checkbox"/>
Win system dead	Deadman	{{.Level}} {{.ID}} {{.Name}} {{.Tim...	slack (default)	<input type="checkbox"/>
Win system high load	Threshold	{{.Level}} {{.ID}} {{.Name}} {{.Tim...	slack (default)	<input type="checkbox"/>

+ Build Alert Rule

5 TICKscripts

Name	Type	Task Enabled
CPU_idle too low	Stream	<input checked="" type="checkbox"/>
System Dead	Stream	<input checked="" type="checkbox"/>
System high load-2core	Stream	<input checked="" type="checkbox"/>
Win system dead	Stream	<input type="checkbox"/>
Win system high load	Stream	<input type="checkbox"/>

+ Write TICKscript

Rule 기반의 Alert 조건을 설정합니다.

Alert Rule Builder

disk
diskio
usage_irq
usage_nice
usage_softirq

Conditions

Send Alert where **mean** is less than **50**

Preview Data from Past 15m

최근 15분 모니터링 데이터를 기반으로 보다 세밀한 Alert 조건을 설정합니다.

Alert Handlers

Send this Alert to: Add another Handler

slack (default) Parameters from Kapacitor Configuration

Webhook URL: Value set in Config

Save this Rule and Edit Configuration

Alert History

14 Alerts

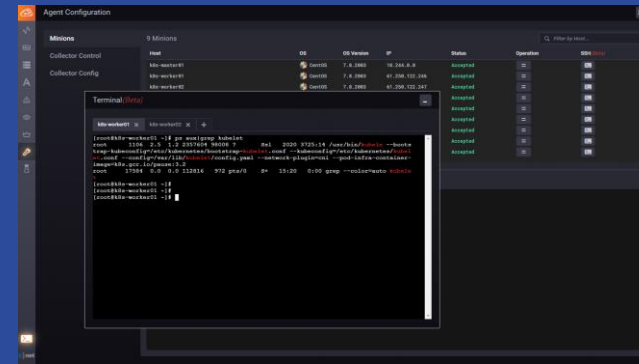
Name	Level	Time	Host	Value
System high load-2core	●	2019-11-12T23:31:05.000Z	server01-vm-cmp	1.5
System high load-2core	●	2019-11-12T23:30:55.000Z	server01-vm-cmp	1.51
System high load-2core	●	2019-11-12T23:30:45.000Z	server01-vm-cmp	1.5
System high load-2core	●	2019-11-12T23:30:35.000Z	server01-vm-cmp	1.53
System high load-2core	●	2019-11-12T23:30:25.000Z	server01-vm-cmp	1.5
CPU_idle too low	●	2019-11-12T23:30:15.000Z	server01-vm-cmp	1.5
System high load-2core	●	2019-11-12T23:30:05.000Z	server01-vm-cmp	1.5
CPU_idle too low	●	2019-11-12T23:29:55.000Z	server01-vm-cmp	1.5
CPU_idle too low	●	2019-11-12T23:29:45.000Z	server01-vm-cmp	1.5
CPU_idle too low	●	2019-11-12T23:29:35.000Z	server01-vm-cmp	1.5
CPU_idle too low	●	2019-11-12T23:29:25.000Z	server01-vm-cmp	1.5
CPU_idle too low	●	2019-11-12T23:29:15.000Z	server01-vm-cmp	1.5
CPU_idle too low	●	2019-11-12T23:29:05.000Z	server01-vm-cmp	1.5
CPU_idle too low	●	2019-11-12T23:28:55.000Z	server01-vm-cmp	1.5

Alert

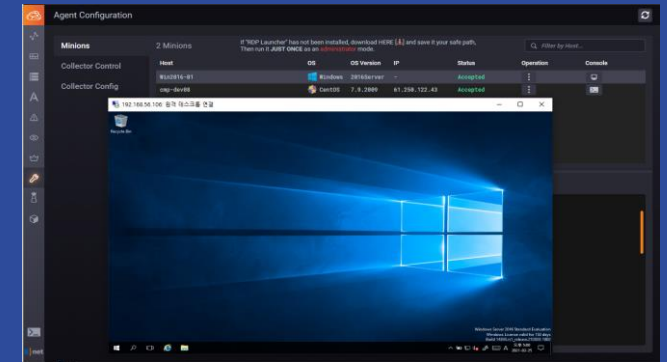
Alert History

User Group
Multi-tenant

SSH Proxy Console

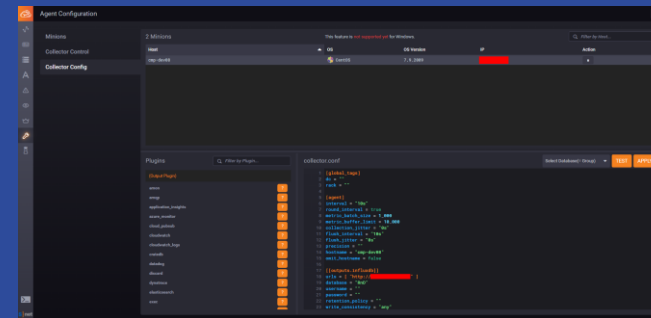


RDP Console
Launcher



System Log
Activity Log

CloudHub Agent
Provisioning &
Management



Other Key Features

“ Dell APEX FoD 환경에서 운영 관리 효율의 극대화를 위한, 실시간 모니터링 & 어플리케이션 구성 관리 통합 시스템 ”



운영 관리 비용 감소	서비스 품질 향상	신속한 장애 대응	시스템 통합 효율화
<ul style="list-style-type: none"> ❖ 다중 호스트에 존재하는 시스템 자원 및 어플리케이션 메트릭에 대한 실시간 시각화 ❖ 수집 항목에 대한 중앙 관리 프로비저닝 제공 	<ul style="list-style-type: none"> ❖ 여러 데이터 상관 분석 차트를 빌드함으로써 장애 원인 파악 향상 ❖ 여러관점에서의 이상 징후에 관하여 잠재적인 문제점을 발견하여 조기에 선제적으로 조치 	<ul style="list-style-type: none"> ❖ 모든 Time-series metric 데이터에 대하여 여러 종류의 Alert 조건 설정 제공 ❖ 스크립터블(Scriptable) 설정을 통해 복잡한 조건의 Alert 설정 지원 	<ul style="list-style-type: none"> ❖ 모듈화 시스템으로서, 머신러닝, 빅데이터 시스템 등과 보다 쉬운 연계 가능 ❖ 특정 조건부 데이터를 타 컴포넌트(Kafka, Slack, Telegram등)로 전송 기능 제공

