엔터프라이즈 쿠버네티스와 DevSecOps 환경 구축을 통한 비즈니스 혁신

안영택

레드햇 / 테크세일즈 SSP(Solution Sales Professionals)

yan@redhat.com

010-7139-7409

The power of open

Red Hat

목 차

(1) 원조 오픈소스 컴퍼니 "레드햇"

(2) 엔터프라이즈 IT와 비즈니스
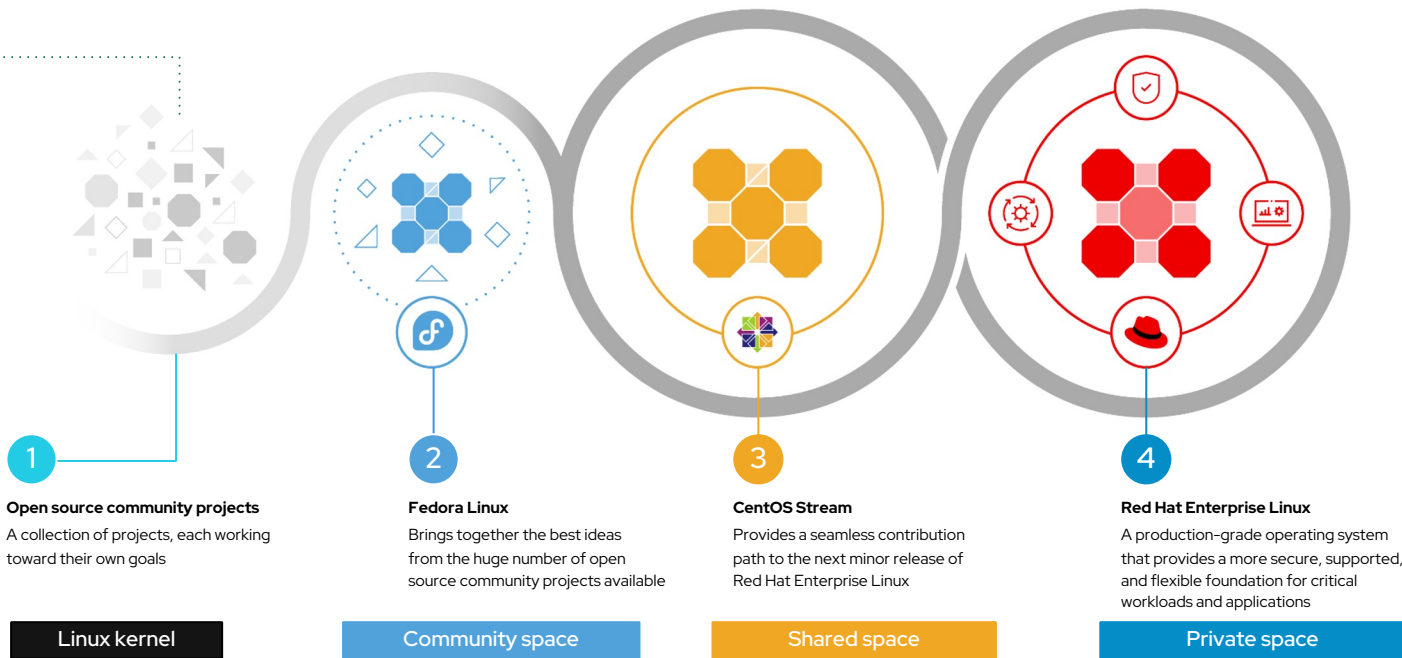
(3) 엔터프라이즈 쿠버네티스와 DevSecOps 플랫폼
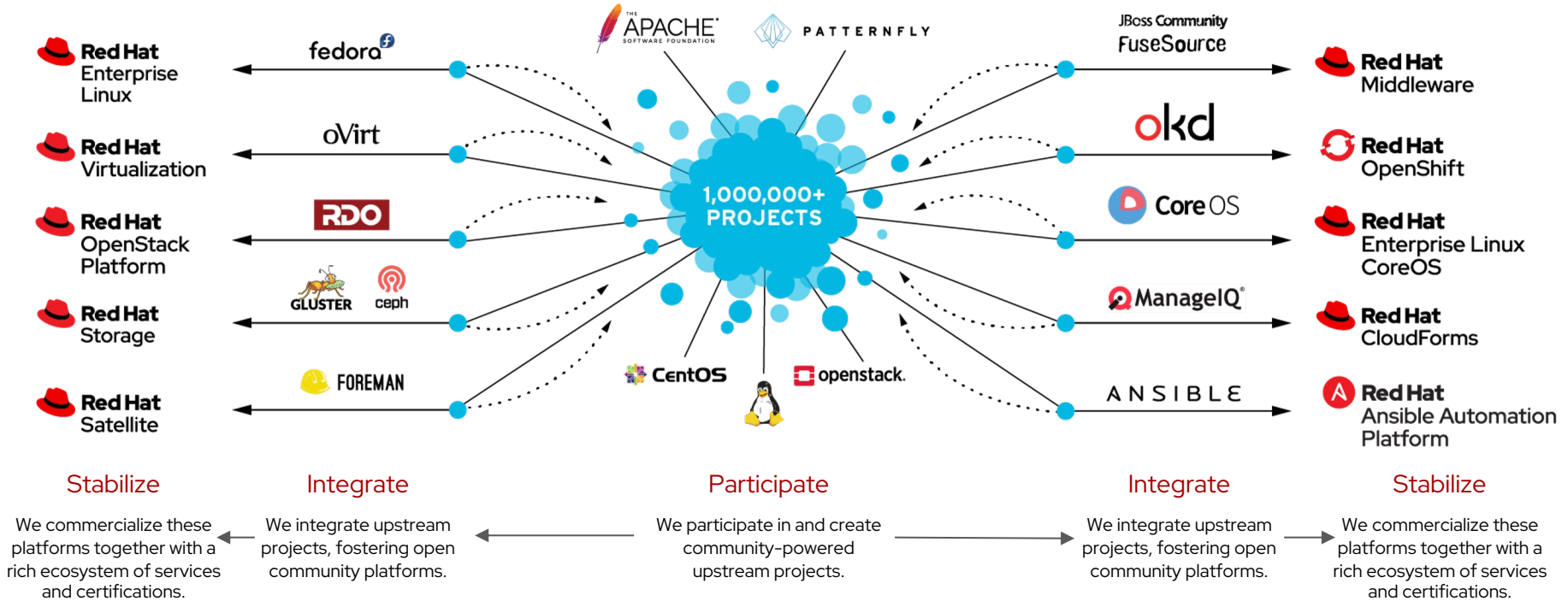
(4) AI 시대의 레드햇 MLOps Way

(5) 레드햇과 고객이 함께 만든 비즈니스 혁신

오픈소스 리눅스와 Red Hat Enterprise Linux

Contributions flow **bi-directional** among all elements of the ecosystem.

1

Open source community projects
A collection of projects, each working toward their own goals

Linux kernel

2

Fedora Linux
Brings together the best ideas from the huge number of open source community projects available

Community space

3

CentOS Stream
Provides a seamless contribution path to the next minor release of Red Hat Enterprise Linux

Shared space

4

Red Hat Enterprise Linux
A production-grade operating system that provides a more secure, supported, and flexible foundation for critical workloads and applications

Private space

오픈소스 커뮤니티부터 엔터프라이즈 솔루션까지

Stabilize	Integrate	Participate	Integrate	Stabilize
We commercialize these platforms together with a rich ecosystem of services and certifications.	We integrate upstream projects, fostering open community platforms.	We participate in and create community-powered upstream projects.	We integrate upstream projects, fostering open community platforms.	We commercialize these platforms together with a rich ecosystem of services and certifications.

30년간 오픈소스의 역사와 가치를 지킨 원조 Open Source Company

90% 이상

of the

Fortune

500

use

Red Hat

products and solutions[1]

~20,000

직원수

105+

오피스

40+

나라

The first

$3

billion

open source company

in the world[2]

(1) 원조 오픈소스 컴퍼니 "레드햇"

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엔터프라이즈 IT 환경의 현실

Mixed infrastructure environments, **diverse app** portfolios, & **limited automation**

Infrastructure

Bare metal

Virtualization

Edge

Private cloud

Public cloud

Applications

AI/ML

Analytics

Serverless

Cloud-native and microservices

Java™

.Net

ISV

People & Processes

Developer tools

Pipeline and processes

People and policies

The right skills

Source: Red Hat detail. "The State of Enterprise Open Source," Feb. 2021.

Red Hat

엔터프라이즈 비즈니스의 생존과 번영을 위한 IT

Traditional N-tier apps

Cloud-native microservices

Data, analytics, and AI/ML

ISV packaged apps

Development
Speed

Operations
Scale

Architecture
Stability

Security

Security

Flexibility
Consistency
Efficiency

Bare metal

Virtual

Private cloud

Public cloud

Edge

9

Red Hat

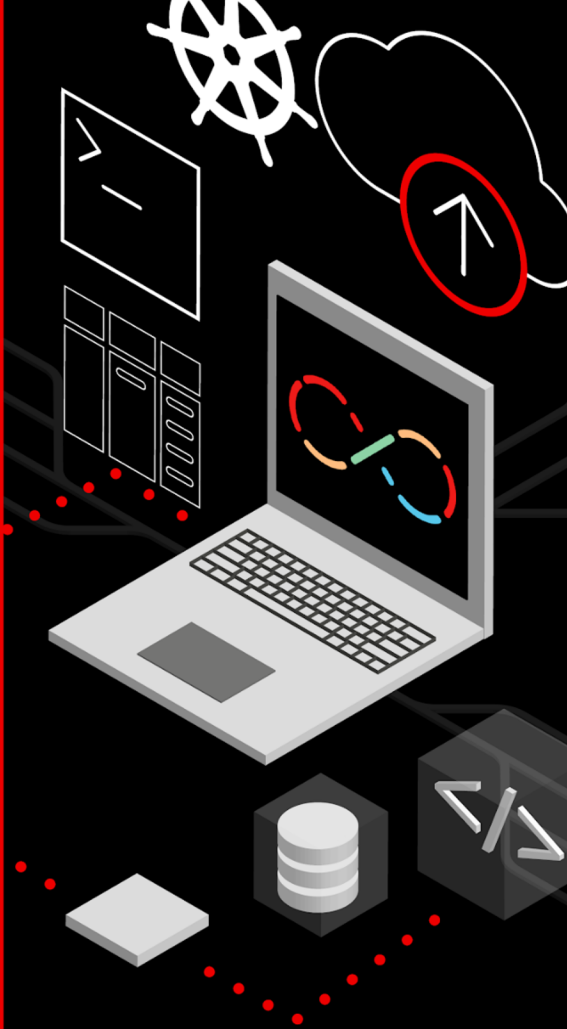# 보안에 대한 우려는 비즈니스 혁신을 지체 시킵니다

57%

worry the most about **security workloads at runtime**[1]

55%

have delayed or slowed down application deployment into production due to **container or Kubernetes security concerns**[1]

32%

have concerns about **the inherent security of enterprise code**[2]

[1] State of Kubernetes security report 2022
[2] Source: The State of Enterprise Open Source: A Red Hat Report, 2022. Full report: red.ht/enterprise
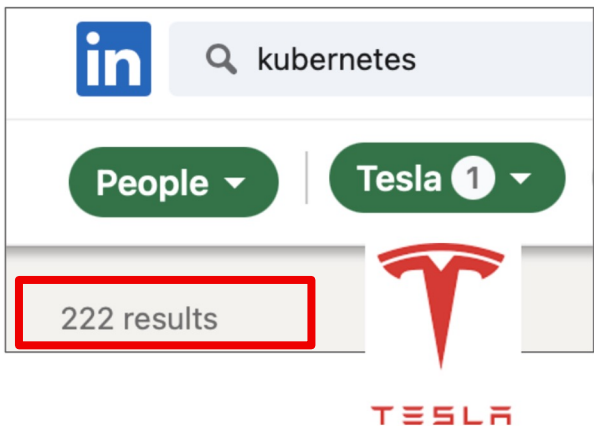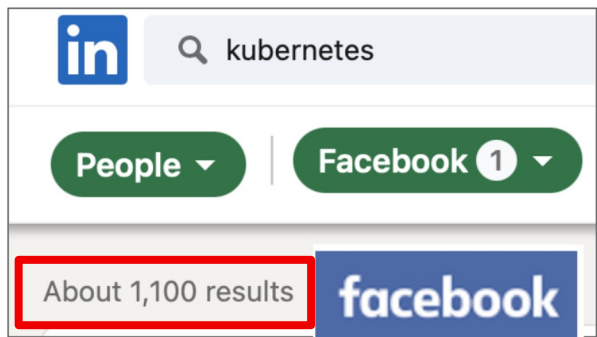
Red Hat

(1) 원조 오픈소스 컴퍼니 "레드햇"

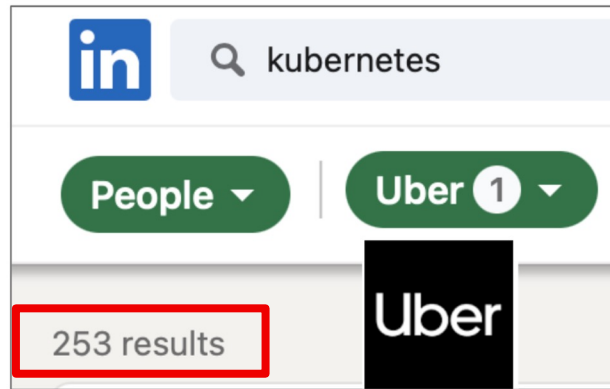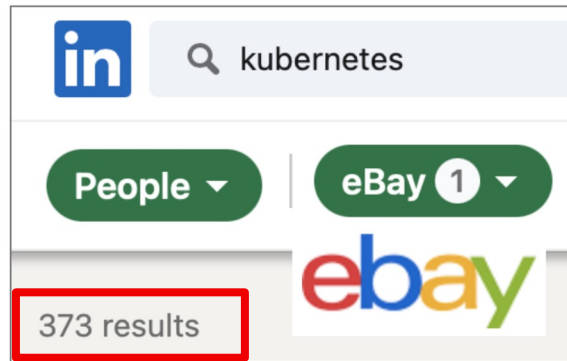(2) 엔터프라이즈 IT와 비즈니스

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글로벌 기업의 쿠버네티스 담당 전문인력 규모

A unicorn or similar sized company with 100s of Kubernetes skilled employees

쿠버네티스를 엔터프라이즈 환경으로

INSTALL	DEPLOY	HARDEN	OPERATE
Templating	Identity & security access	Platform monitoring & alerts	OS upgrade & patch
Validation	App monitoring & alerts	Metering & chargeback	Platform upgrade & patch
OS setup	Storage & persistence	Platform security hardening	Image upgrade & patch
	Egress, ingress, & integration	Image hardening	App upgrade & patch
	Host container images	Security certifications	Security patches
	Build/Deploy methodology	Network policy	Continuous security scanning
		Disaster recovery	Multi-environment rollout
		Resource segmentation	Enterprise container registry
			Cluster & app elasticity
			Monitor, alert, remediate
			Log aggregation

Kubernetes Failure Stories

A compiled list of links to public failure stories related to Kubernetes. Most recent publications on top.

- **10 More Weird Ways to Blow Up Your Kubernetes - Airbnb - KubeCon NA 2020**
  - involved: MutatingA...
  - impact: outages
- Why we switched from fl...
  - involved: fluent-bit,
  - impact: lost applicat...
- Make your services faste...
  - involved: kops, CPU
  - impact: high latency
- The case of the missing
  - involved: EKS, AWS
  - impact: frequent co...

ars TECHNICA   BIZ & IT   TECH   SCIENCE   POLICY   CARS   GAMING & CULTURE   STOR

CRYPTOCURRENCY JACKING —

Tesla cloud resources are hacked to run cryptocurrency-mining malware

Crooks find poorly secured access credentials, use them to install stealth miner.

DAN GOODIN - 2/21/2018, 3:21 AM

설치와 운영, 업그레이드의 복잡성 때문에 엔터프라이즈 기업의 75% 이상이 적용 어려움

Even Iron Man himself is not immune!
(unsecured K8s administrative[2])

Source: [1] https://codeberg.org/hjacobs/kubernetes-failure-stories
[2] Tesla cloud resources are hacked to run cryptocurrency-mining malware, ArsTechnica, Accessed 17th June 2021

엔터프라이즈 쿠버네티스를 위한 라이프사이클

Red Hat은 기업 고객을 위하여 Kubernetes를 보다 견고하게 만들어 OpenShift를 출시합니다.

1.16 (2019. 10. 22)	1.17 (2019. 12. 9)	1.18 (2020. 3. 25)	1.19 (2020. 8. 26)	1.20 (2020. 12. 8)	1.21 (2021. 4. 8)	1.22 (2021. 8. 4)	1.26 (2023.Q1)

2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3	2023 Q1	2023 Q2

4.3 (2020. 1. 23)
4.4 (2020. 5. 5)
4.5 (2020. 7. 13)
4.6 (2020. 10.27)
4.7 (2021. 2. 24)
4.8 (2021. 7. 27)
4.9 (2021. 10. 18)
4.13 (2023 5.17)
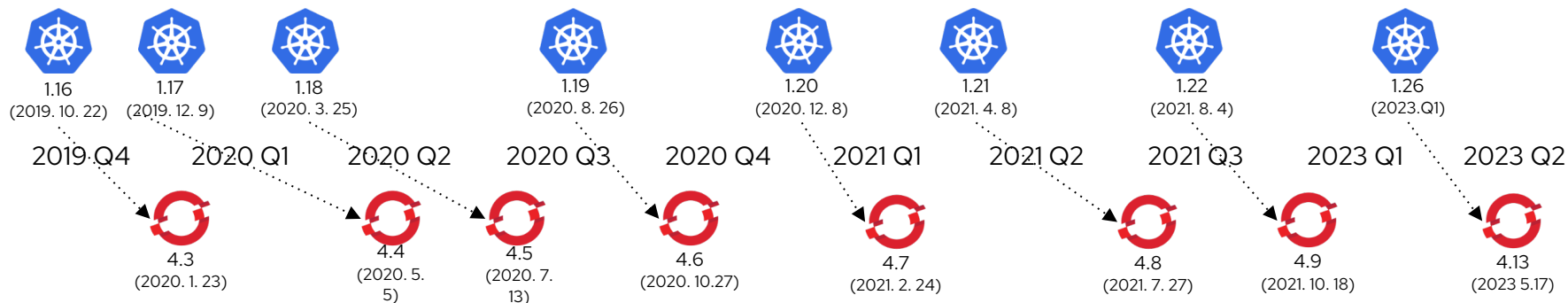
Kubernetes Release

1-3 months hardening

OpenShift Release

풀스택 오픈 하이브리드 클라우드 플랫폼

Red Hat
Advanced Cluster Management
for Kubernetes

Red Hat
Advanced Cluster Security
for Kubernetes

Red Hat
Quay

Red Hat
OpenShift
Data Foundation

Red Hat
OpenShift
Platform Plus

Multicluster management	**Cluster security**	**Global registry**	**Cluster data management**
Observability | Discovery | Policy | Compliance | Configuration | Workloads	Declarative security | Container vulnerability management | Network segmentation | Threat detection and response	Image management | Security scanning | Geo-replication Mirroring | Image builds	RWO, RWX, Object | Efficiency | Performance | Security | Backup | DR Multicloud gateway

Red Hat
OpenShift
Container Platform

Manage workloads	**Build cloud-native apps**	**Data-driven insights**	**Developer productivity**
Platform services	Application services*	Data services*	Developer services
• Service mesh | Serverless • Builds | CI/CD pipelines • GitOps | Distributed Tracing • Log management • Cost management	• Languages and runtimes • API management • Integration • Messaging • Process automation	• Databases | Cache • Data ingest and preparation • Data analytics • AI/ML	• Developer CLI | IDE • Plugins and extensions • CodeReady workspaces • CodeReady containers

Red Hat
OpenShift
Kubernetes Engine

Kubernetes cluster services
Install | Over-the-air updates | Networking | Ingress | Storage | Monitoring | Log forwarding | Registry | Authorization | Containers | VMs | Operators | Helm

Kubernetes (orchestration)

Red Hat
Enterprise Linux

Linux (container host operating system)

Red Hat
Enterprise Linux
CoreOS

Physical   Virtual   Private cloud   Public cloud   Edge

* Red Hat OpenShift® includes supported runtimes for popular languages/frameworks/databases. Additional capabilities listed are from the Red Hat Application Services and Red Hat Data Services portfolios.
** Disaster recovery, volume and multicloud encryption, key management service, and support for multiple clusters and off-cluster workloads requires OpenShift Data Foundation Advanced

퍼블릭 클라우드에서 Red Hat OpenShift 서비스

Managed Red Hat OpenShift Services – Fully managed, start quickly

aws

Azure

IBM **Cloud**

Google Cloud

| Red Hat OpenShift Service on AWS | Azure Red Hat OpenShift | Red Hat OpenShift on IBM Cloud | Red Hat OpenShift Dedicated |

Self-Managed Red Hat OpenShift – Customer managed, for control and flexibility

Red Hat OpenShift

On **public cloud**, on-premises on **physical** or **virtual** infrastructure, or at the edge

Red Hat

A DevSecOps model
across your entire architecture
on a single platform

Application platform

Build, deploy, and run applications
from idea to production

Kubernetes infrastructure

Run containers consistently
from core, to cloud, to edge

Red Hat
OpenShift

지속적인 통합 (CI) & 지속적인 딜리버리 (CD)

A key **DevOps** principle for automation, consistency and reliability

Build	Test	Security Checks	Release	Deploy Stage	Deploy Prod

Continuous Integration

Continuous Delivery

OpenShift Build

Automate building container images using Kubernetes tools

OpenShift Pipelines

Kubernetes-native on-demand delivery pipelines(**Tekton**)

OpenShift GitOps

Declarative GitOps for multi-cluster continuous delivery(**ArgoCD**)

Ecosystem Integrations

GitHub   GitLab   Azure DevOps   Travis CI

Red Hat

데브옵스 + 보안(ACS)

Security across the entire application lifecycle

POLICY-AS-CODE

- **Image scanning**
- **Host scanning**
- Serverless scanning
- **Configuration scanning**
- Compliance checks, auditing, reporting, remediation
- **CI/CD integration and automation**
- Artifact attestation

DESIGN · **ADAPT** · **DEPLOY** · **RUN** · **BUILD** · **PACKAGE** · **ADAPT** · **MANAGE**

Dev · Ops

- **Runtime threat detection**
  - ✓ Process allowlisting
  - ✓ Anomaly detection
  - ✓ Policy-based detection
- **Runtime vulnerability management**
- Incident response
- Integrations
  - ✓ SIEM
  - ✓ Registries, CI/CD, runtimes, notification tools
- Feedback loop

VISIBILITY (images, deployments, network flows, processes, secrets use)

CONTAINERS AND K8S (on-premises, cloud/hybrid, edge)

Red Hat

쿠버네티스 클러스터와 어플리케이션의 토탈 보안

Control

Protect

Detect & Respond

ACS

Control	Protect	Detect & Respond
Vulnerability analysis	Policy admission controller	Runtime behavioral analysis
App config analysis	Compliance assessments	Auto-suggest network policies
APIs for CI/CD integrations	Risk profiling	Threat detection / incident response

OCP

Control	Protect	Detect & Respond
Trusted content	Kubernetes platform lifecycle	Container isolation
Container registry	Identity and access management	Network isolation
Build management	Protect platform data	Protect application access and data
CI/CD pipeline	Deployment policies	Observability

BUILD	DEPLOY	RUN

DevSecOps

DevOps Platform 2023년도 가트너 보고

Figure 1: Magic Quadrant for DevOps Platforms

Source: Gartner

Source: Gartner, "Magic Quadrant for DevOps Platforms," June 2023

컨테이너 보안 분야에서의 레드햇 리더쉽

April 2022

OVERALL LEADER

FOLLOWER

QUALYS VMWARE LACEWORK AQUA SECURITY RED HAT
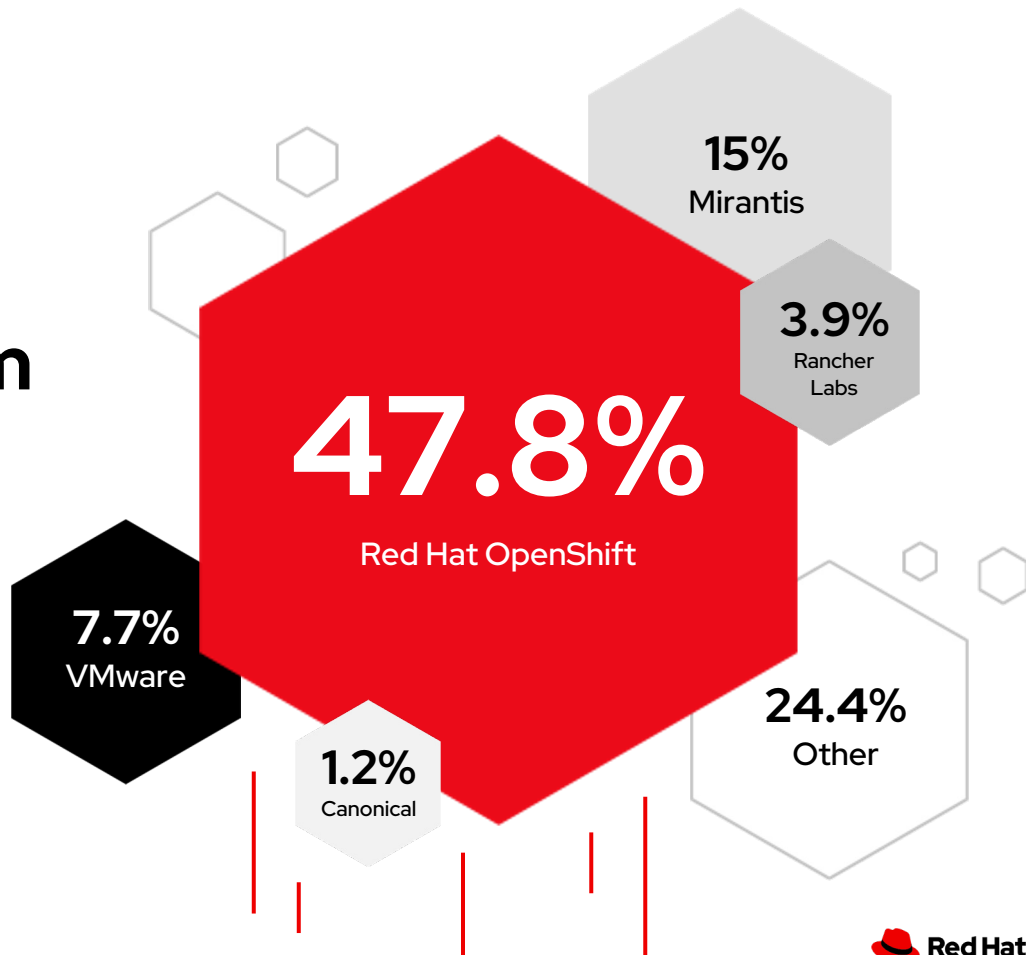FIDELIS TIGERA SYSDIG SUSE NEUVECTOR PALO ALTO

CHALLENGER

Red Hat is a veteran vendor of enterprise open-source solutions, including OpenShift, a leading enterprise-grade container orchestration platform. With a massive market presence and proven expertise in container management, enhanced by the recent acquisition and integration of StackRox, a leading container security company, Red Hat is recognized as the Overall Leader in this Leadership Compass.

Source: Kuppinger Cole Analysts, "Container Security Leadership Compass"

Red Hat OpenShift

Container platform 시장 점유율 1위

47.8%
Red Hat OpenShift

15%
Mirantis

3.9%
Rancher Labs

7.7%
VMware

1.2%
Canonical

24.4%
Other

Red Hat

(1) 원조 오픈소스 컴퍼니 "레드햇"
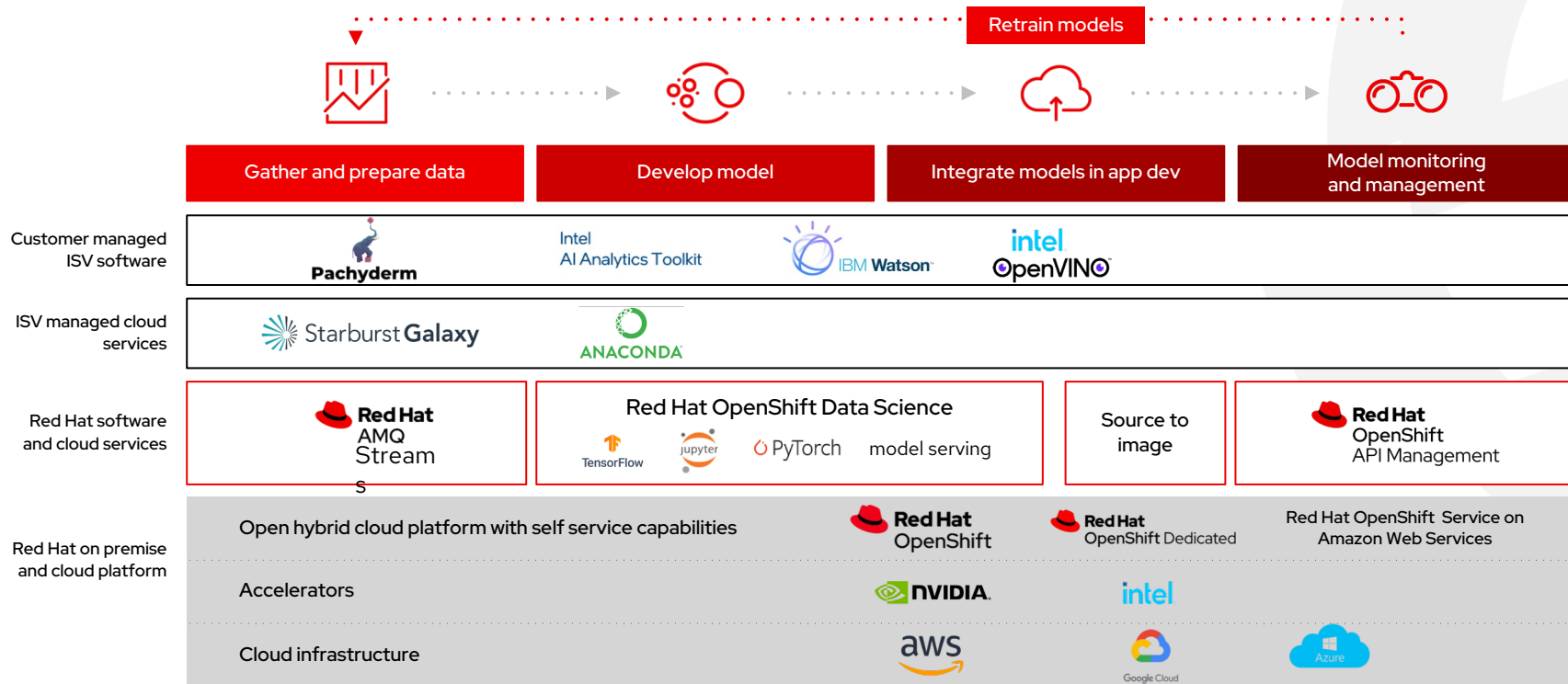
(2) 엔터프라이즈 IT와 비즈니스

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AI/ML SW의 개발 라이프 사이클

Red Hat OpenShift Data Science

하이브리드 MLOps 플랫폼

Collaborate within a common platform to bring IT, data science, and app dev teams together

Now available as fully managed cloud service or traditional software product on-prem or in the cloud!

모델 개발 (Model development)

Conduct exploratory data science in **JupyterLab** with access to core **AI / ML libraries and frameworks** including **TensorFlow** and **PyTorch** using our notebook images or your own.

모델 지원과 모니터링 (Model serving & monitoring)

Deploy models across any cloud, fully managed, and self-managed OpenShift footprint and centrally **monitor their performance.**

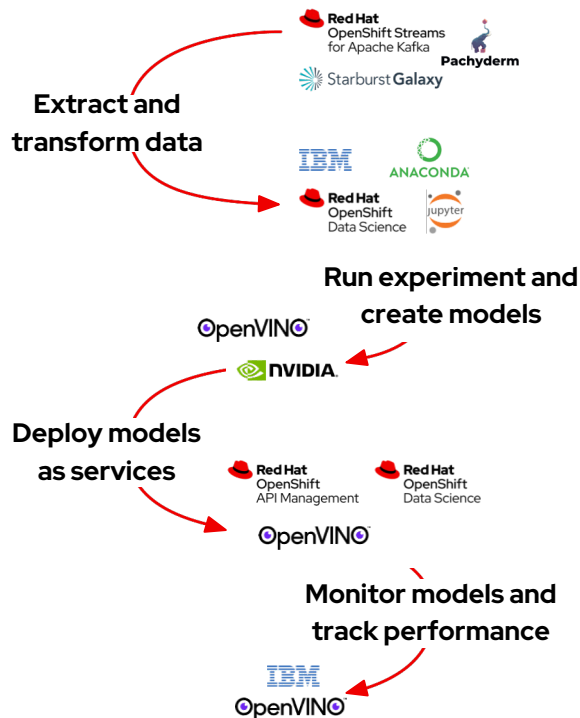## 라이프 사이클 관리 (Lifecycle Management)

Create repeatable data science pipelines for **model training and validation and integrate them with DevOps pipelines** for delivery of models across your enterprise.

증강된 기능과 협업 (Increased capabilities / collaboration)

Create projects and share them across teams. Combine Red Hat components, open source software, and **ISV certified software**.

에코 솔루션들과 호환성 협력과 통합 운영 간소화

Extract and transform data

Run experiment and create models

Deploy models as services

Monitor models and track performance

Starburst Galaxy

Unlock the value of your data by making it fast and easy to access data across hybrid cloud.

Pachyderm

Brings data versioning and governance to your most precious asset

Anaconda Professional

Curated access to an extensive set of data science packages to be used in your Jupyter projects.

IBM Watson Studio

Build, run, and manage AI models at scale with Watson Machine Learning and Watson OpenScale.

NVIDIA

GPU-enabled hardware makes it easier for customers to stand up resource-intensive environments and accelerate their data science experiments.
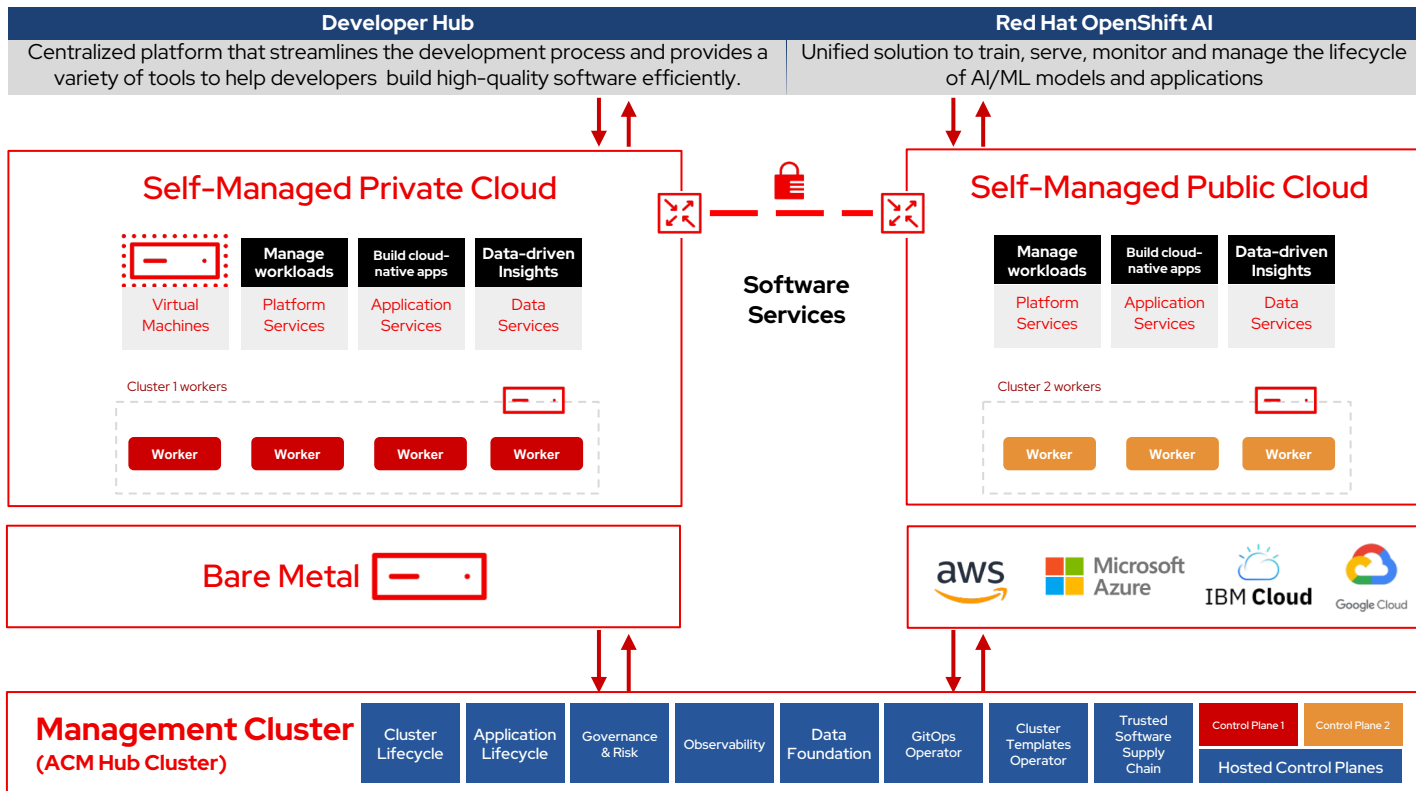
Intel OpenVINO Notebook Images
Toolkit of pre-trained models optimized for intel processors and GPUs
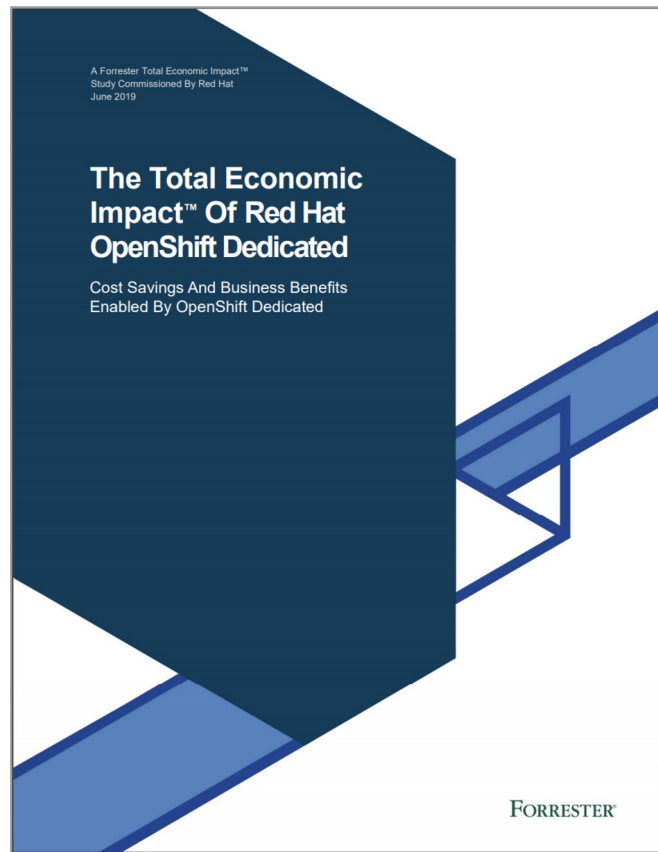
Intel OpenVINO Model Server
Scalable, High-Performance serving engine

멀티 클러스터 & 하이브리드 클라우드 AI 플랫폼

Developer Hub	Red Hat OpenShift AI
Centralized platform that streamlines the development process and provides a variety of tools to help developers build high-quality software efficiently.	Unified solution to train, serve, monitor and manage the lifecycle of AI/ML models and applications

Self-Managed Private Cloud

Virtual Machines	Manage workloads — Platform Services	Build cloud-native apps — Application Services	Data-driven Insights — Data Services

Cluster 1 workers

Worker Worker Worker Worker

Software Services

Self-Managed Public Cloud

Manage workloads — Platform Services	Build cloud-native apps — Application Services	Data-driven Insights — Data Services

Cluster 2 workers

Worker Worker Worker

Bare Metal

aws Microsoft Azure IBM Cloud Google Cloud

Management Cluster (ACM Hub Cluster)

Cluster Lifecycle	Application Lifecycle	Governance & Risk	Observability	Data Foundation	GitOps Operator	Cluster Templates Operator	Trusted Software Supply Chain	Control Plane 1	Control Plane 2
								Hosted Control Planes	

Red Hat

(1) 원조 오픈소스 컴퍼니 "레드햇"

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**The Total Economic
Impact™ Of Red Hat
OpenShift Dedicated**

Cost Savings And Business Benefits
Enabled By OpenShift Dedicated

FORRESTER®

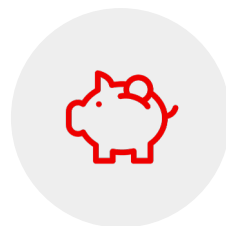**343%**
3년간 투자대비이익(ROI)

90%
개발자 생산성 향상

3000+
1년간 개발 운영 시간 감소

레드햇 오픈시프트 고객들의 비즈니스 혁신

40%
Increase in sales over 3 years
with new revenue streams[1]

70%
**Infrastructure cost
reduction for AI workloads[2]**

Automated, full
stack installation

Seamless Kubernetes
deployments

Auto-scaling
of resources

One-click
life-cycle management

Source:
1 – Employers centralizes insurance apps on Red Hat OpenShift, March 2021
2 – Turkcell supports AI-powered innovation with Red Hat OpenShift, August 2021

Red Hat

Turkcell supports **AI-powered innovation** with Red Hat OpenShift

Reduced **AI development and operations costs** by **70%**

Cut application **deployment time** from months to seconds.

Improved **developer productivity** with self-service IT environment with automation

TURKCELL

"Running Red Hat OpenShift containers and **highly efficient NVIDIA GPUs** have helped Turkcell significantly reduce the number of physical servers needed to support AI workloads."

"We no longer need to procure physical servers for new projects. In operations, we've seen a 50–70% reduction in the cost of hardware servers from using Red Hat OpenShift to consolidate our AI workloads."

—

Orhan Biyiklioglu

Cloud Engineering Manager, Turkcell

Red Hat

ANZ Bank deployed a container application platform to **speed development** to keep pace with **business growth**.[3]

Accelerated deployment time by **98%**

Improved **developer productivity** and collaboration

[3] Red Hat video. "ANZ Bank reduces deployment time by 98% with container platform." *YouTube,* April 2019.

"We moved from ticket handling to ... demonstrating inventive thinking in network automation development and infrastructure. Red Hat **Consulting Service** gave us the tools to successfully transform with inspiration and confidence."

—

Dave Wasley
Technology Area Lead, Infrastructure
ANZ Bank New Zealand

Medifé

Medife teamed up with Red Hat to transform its legacy infrastructure and paper-based processes.

Deliver services **92% faster**

Processes **400% more invoices**

Red Hat

Medifé

"During the **pandemic**, maintaining strong digital connections to associates in the **healthcare sector** is essential. Red Hat helped us achieve that connectivity to work more efficiently, no matter where our employees are located."

—

Leonardo Lamas
CEO, Medifé

Red Hat

BMW GROUP

The BMW Group **ConnectedDrive** & **AI/ML** platform scaled as the data scaled

12 million connected cars

1 billion requests per week

[2] Red Hat Summit 2019 keynote, 9 May 2019;
[3] Red Hat Forum DACH, 14 Jan. 2020.

Red Hat

BMW GROUP

"We can localize clusters in different markets if we need to and therefore serve our customers on a worldwide scale."

Dr. Alexander Lenk
Lead Architect Connected Vehicle, Digital Backend,
Big Data, Blockchain
BMW Group

Red Hat

**An Roinn Talmhaíochta,
Bia agus Mara**
Department of Agriculture,
Food and the Marine

The Government of Ireland's Department of Agriculture, Food, and the Marine chose Red Hat OpenShift to mitigate risk of financial penalties and reputational damage from major breaches

Improved security and **stability** with enterprise technology and support [3]

Significantly **reduced breaches** with intelligent, **AI/ML text analysis solution**[3]

Red Hat

[3] Source: Red Hat DAFM Ireland case study. Apr. 2021.

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

"The true value in Red Hat's subscription is that in-depth product knowledge … We can rely on Red Hat to help us bring the best possible projects to production **in the safest, most stable way**."

Stephen Griffin

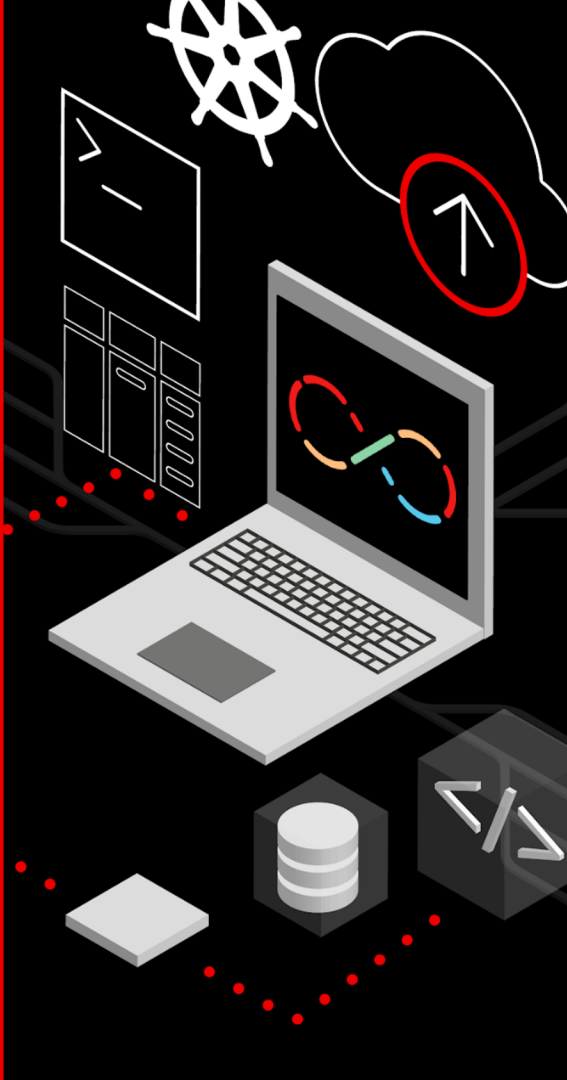Architect and Software Development Manager, Version 1

Red Hat

엔터프라이즈 쿠버네티스와 DevSecOps 환경 구축을 통한 비즈니스 혁신

안영택

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