

애저 클라우드에서 활용하는 도커 / 컨테이너 / 쿠버네티스

최영락

November 2021

Introduction – Ian Choi

- Developer Audience Product Marketing Manager at Microsoft (from Nov 2018)
- Developer community activities
 - ✓ Microsoft Ex-MVP: Cloud & Datacenter Management (July 2016 – Oct 2018)
 - ✓ OpenStack (Internationalization, Election official, Korea user group organizer)
 - ✓ K8s – Docs L10n: Korean reviewer, Facebook Developer Circles - Seoul Lead

At the end, we also had a chance to take picture with a young talented Korean programmer who work days and nights in developing the world. We also made friends from all around the world who are contributing to the advance of humanity. Microsoft Future Now 2019 was a valuable experience to us. We also would like to thank School of Business & Economics, School of Engineering and Tan Tao University for giving us an opportunity like this.



목차

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3. 클라우드 네이티브와 컨테이너 & 쿠버네티스 기술 트렌드



컨테이너가 바꾼 IT & 개발 세계

Q: 화물 수송에서 쓰이는 컨테이너, 어떤 관계가 있을까요?

a very brief
History
of
Shipping



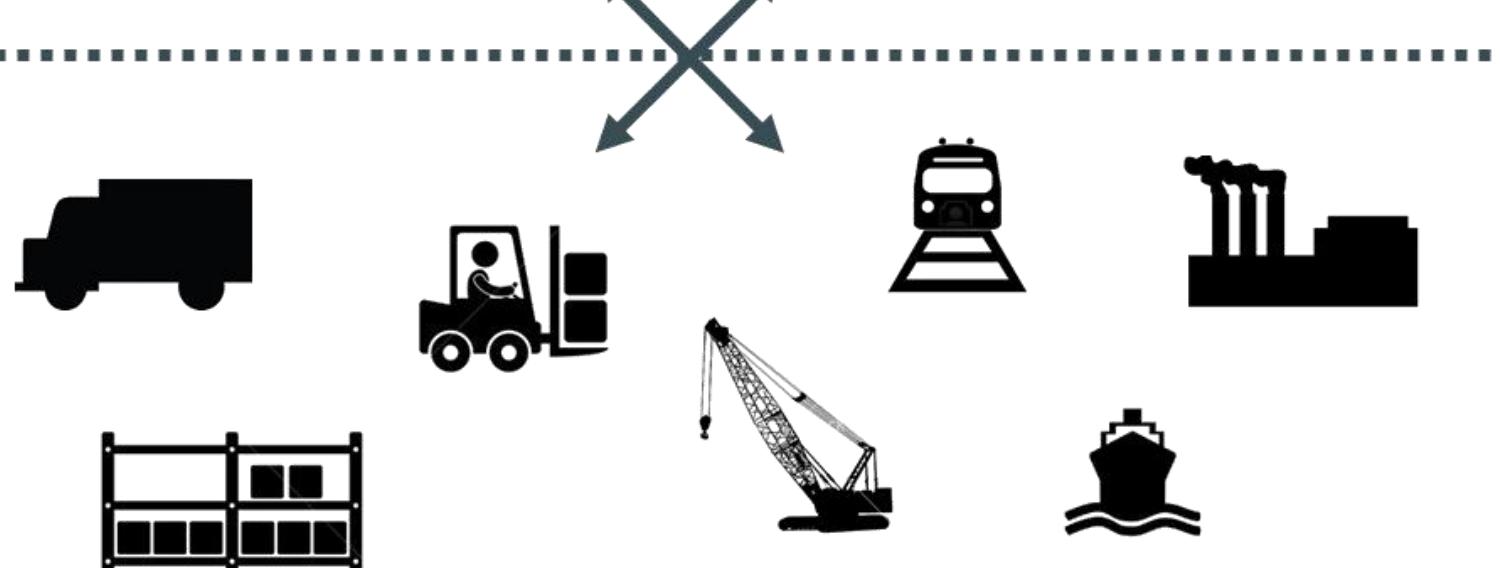
화물 수송 (1960년대 이전)

다양한 상품
종류



(제가 해당
상품이 어떻게
수송되는지
자세히 신경써야
할 필요가
있을까요?)

상품에 따른
다양한 수송 &
보관 방법



(화물 운송을 더
빠르고 원활하게
할 수 있을까요?)

화물 수송 (1960년대 이전)

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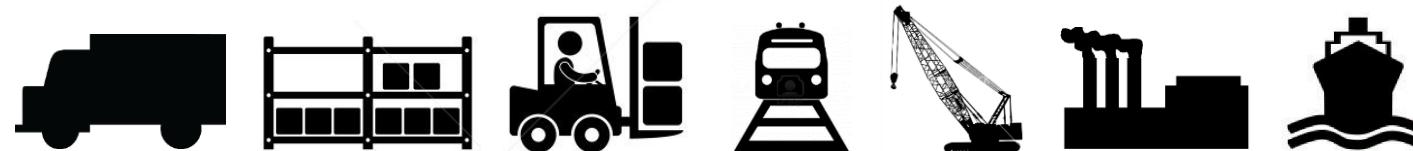
선적 컨테이너 개념이 가져다 준 해결책

다양한 상품
종류



(제가 해당
상품이 어떻게
수송되는지
자세히 신경써야
할 필요가
있을까요?)

상품에 따른
다양한 수송 &
보관 방법



(화물 운송을 더
빠르고 원활하게
할 수 있을까요?)





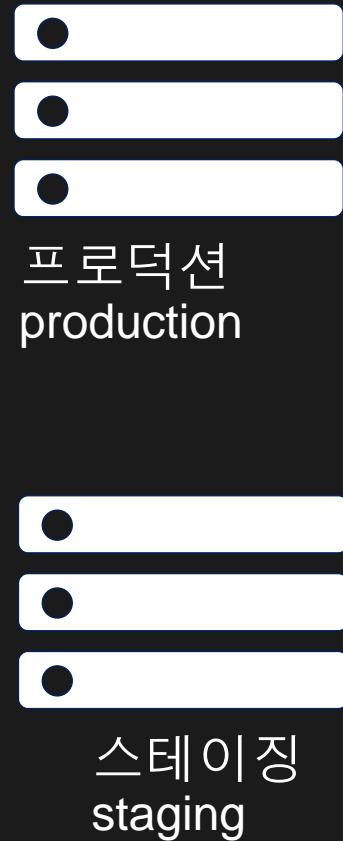
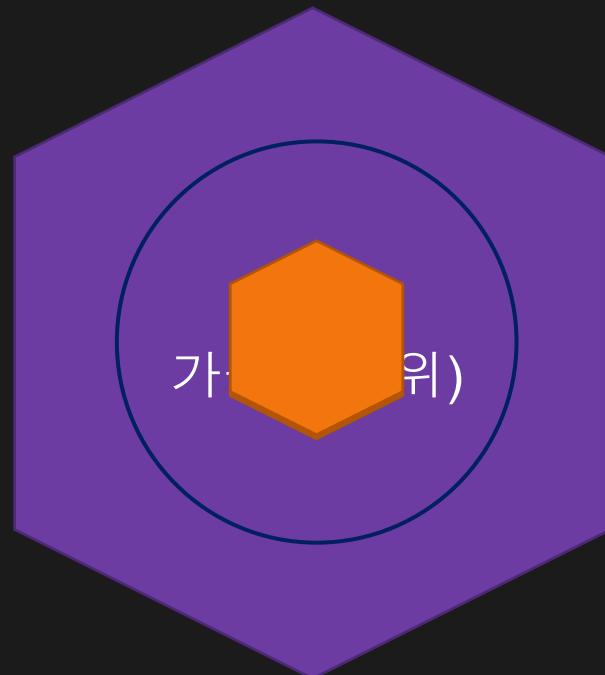
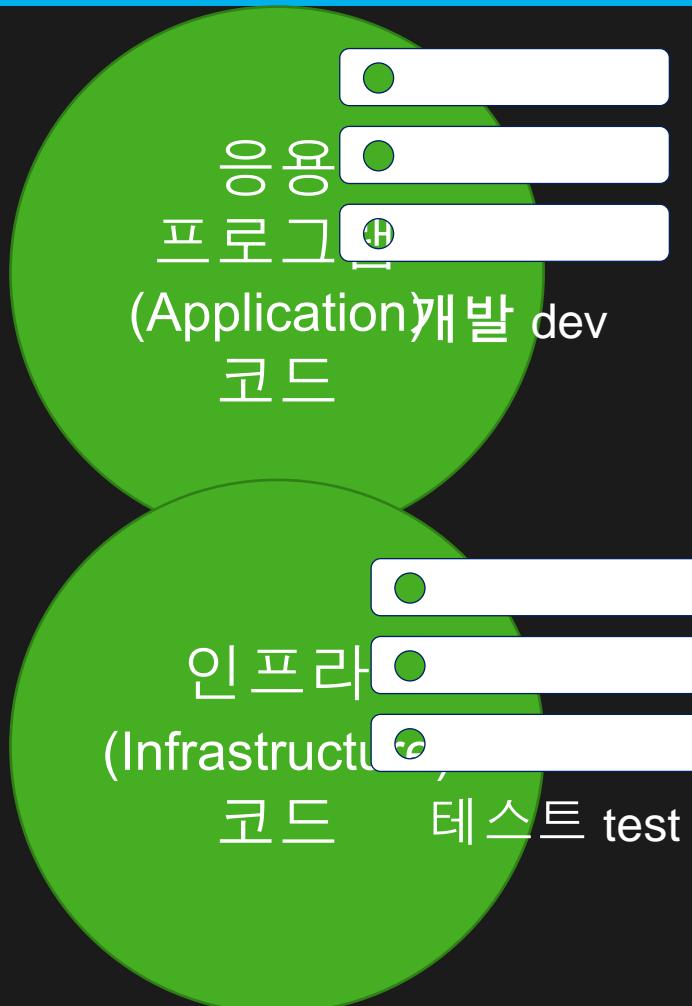
so

What's
The Big Deal?

(프로그래밍) 코드를 컨테이너로



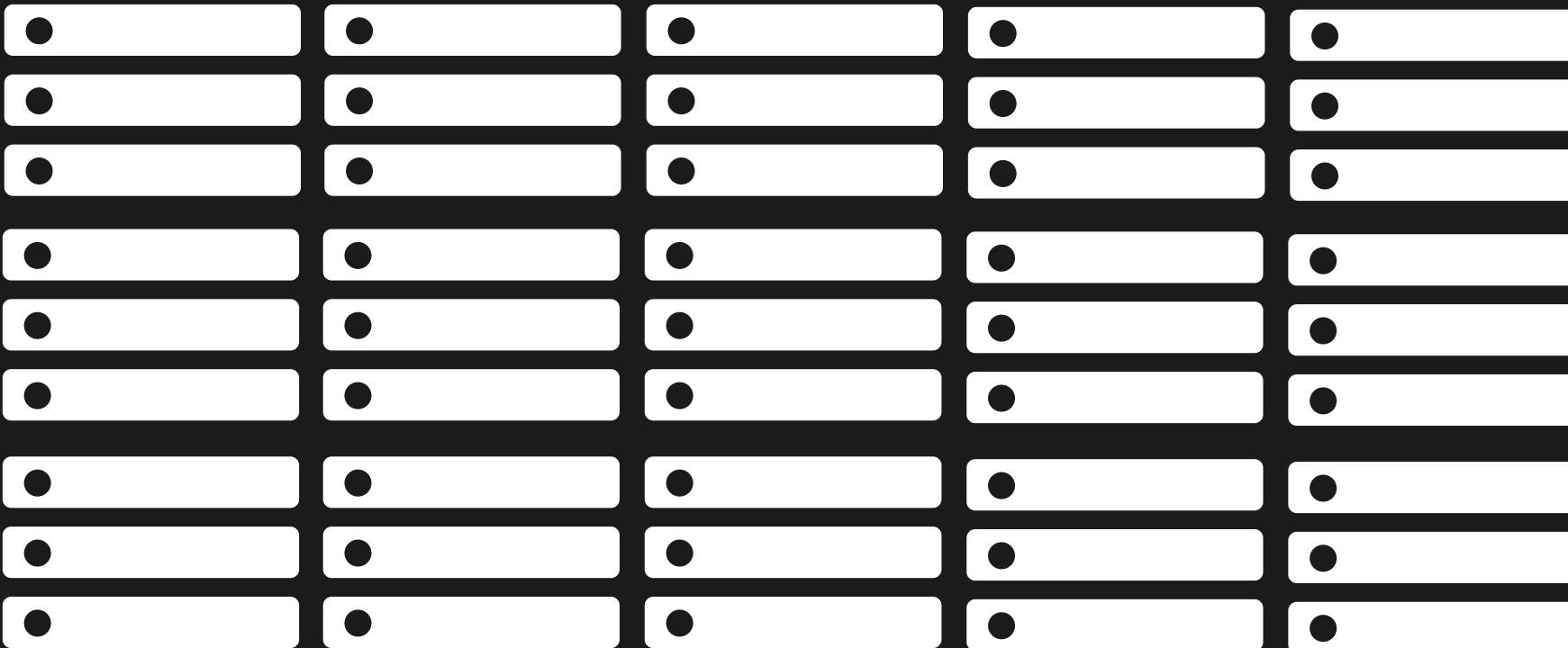
(프로그래밍) 코드를 컨테이너로



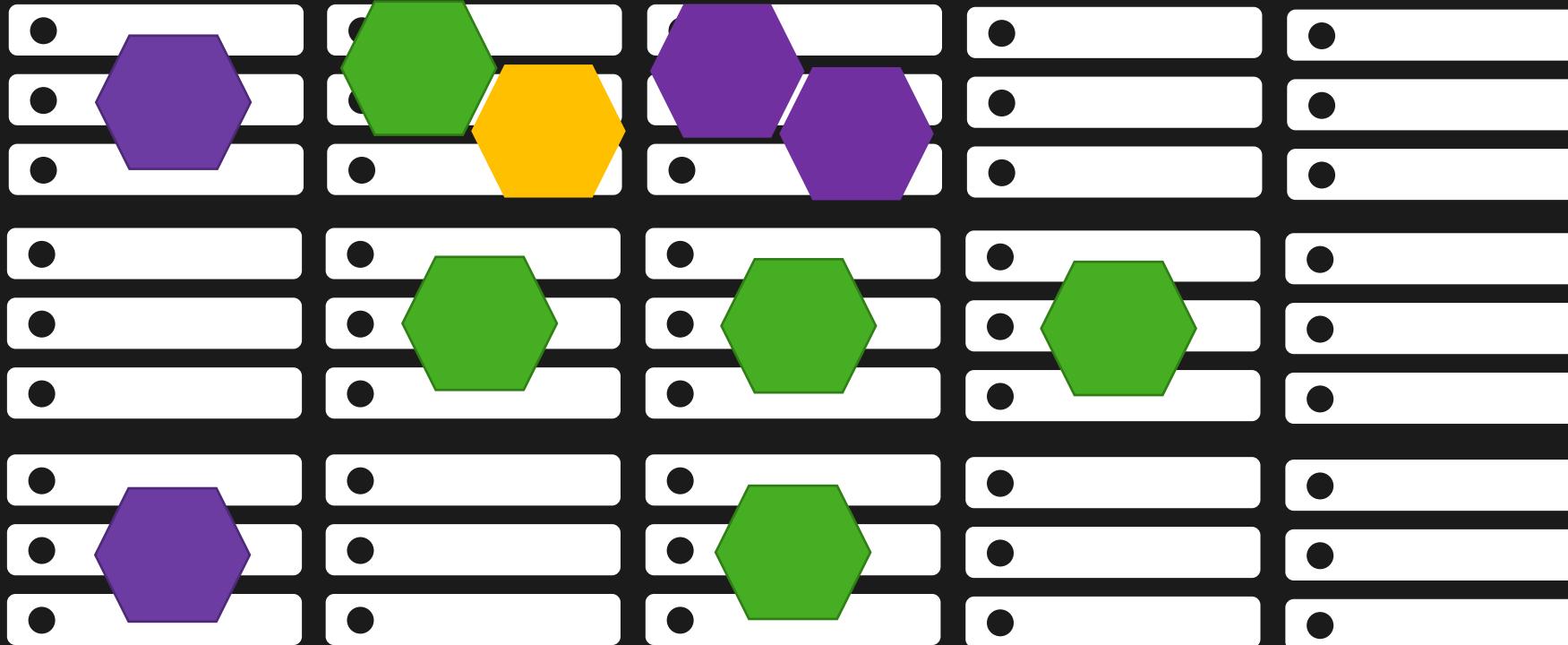


집적도 & 효율성 (density & efficiency)

물리/가상 머신 - 컨테이너가 없을 때



물리/가상 머신 & 컨테이너 환경



화물 수송 vs. 컨테이너



N x M Matrix

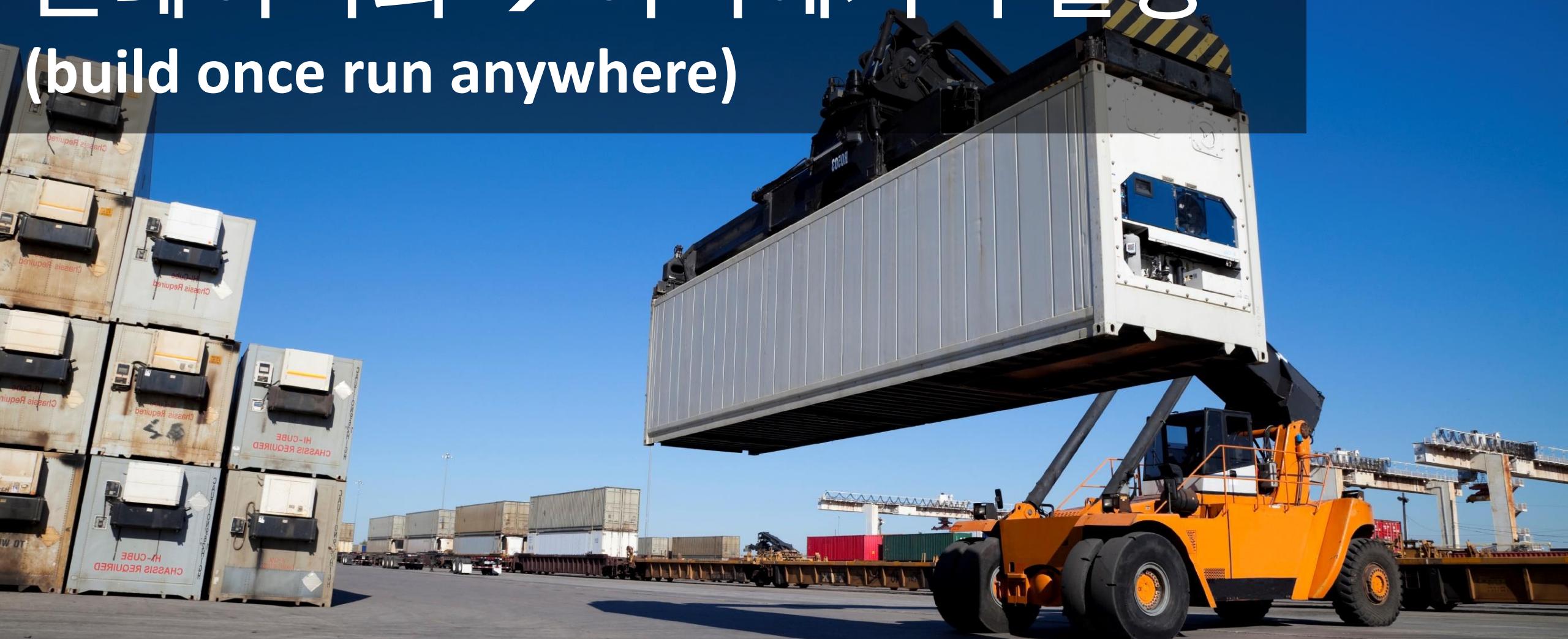
	Development VM	QA Server	Single Prod Server	Onsite Cluster	Public Cloud	Customer Server	...
Static Website	AA	AB	AC	AD	AE	AF	AZ
Web frontend	BA	BB	BC	BD	BE	BF	BZ
User DB	CA					CF	CZ
Analytics DB	DA	DB	D		DE	DF	DZ
Queue	EA	EB	EC	ED	EE	EF	EZ
...	ZA	ZB	ZC	ZD	ZE	ZF	ZZ

Dependency Hell

VS.

N x M Matrix

컨테이너화 → 어디에서나 실행
(build once run anywhere)



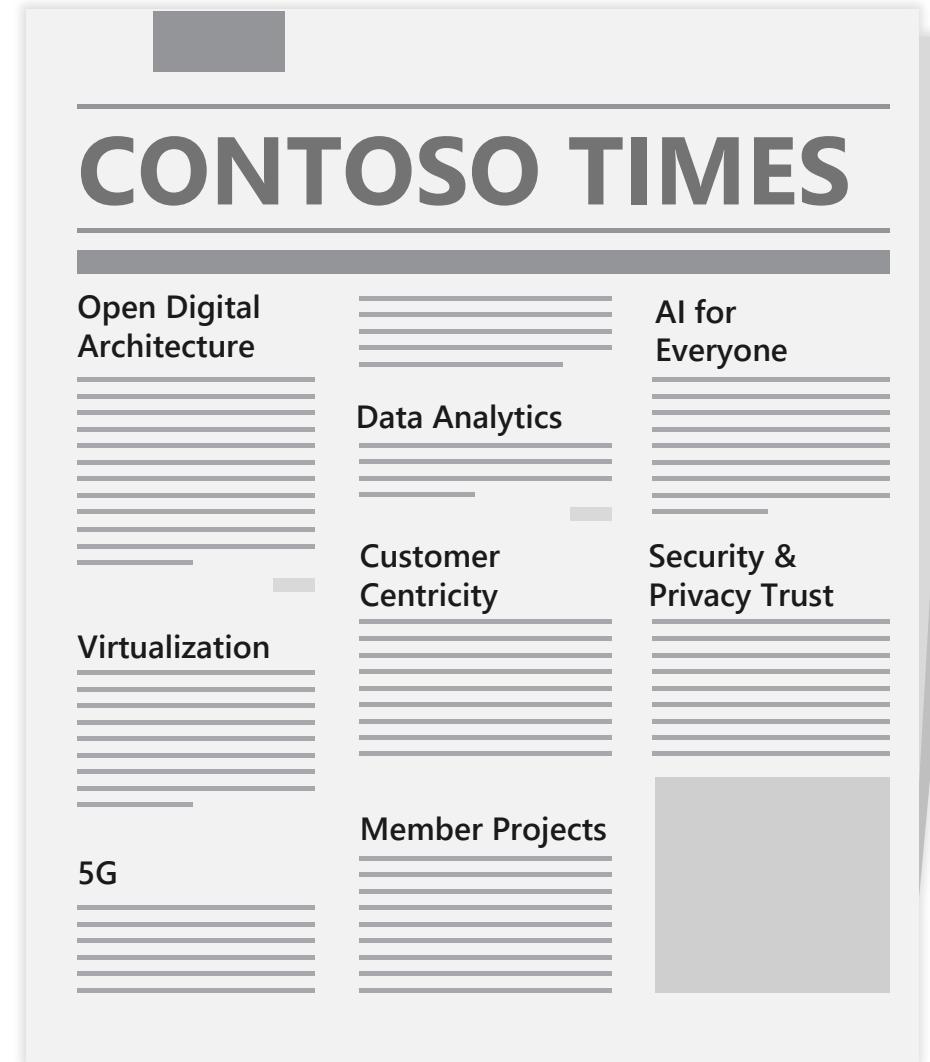
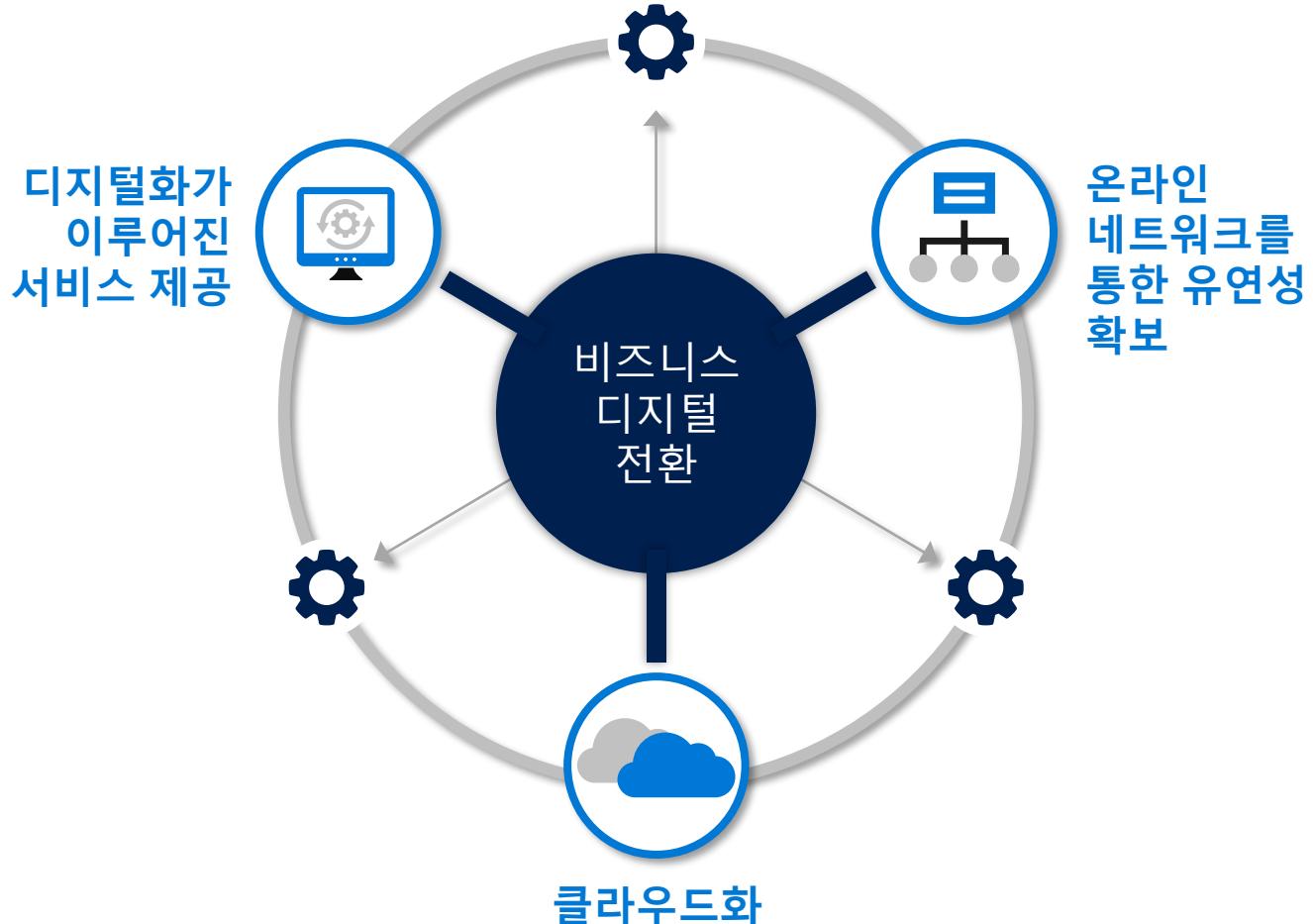
A photograph of a modern building facade constructed from various shipping containers. The containers are painted in different colors, including yellow, brown, green, and blue, and are stacked at different angles. Some containers have windows or doors. The building is set against a bright blue sky with some white clouds. In the foreground, there's a metal railing and some bare trees.

マイクロサービス (micro services)

The
End

2. Azure와 도커 & 컨테이너 기술 이해

빠른 전환을 필요로 하는 비즈니스



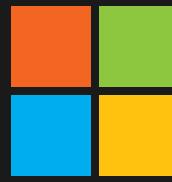
클라우드와 Network: Microsoft Azure Regions

66

Azure regions

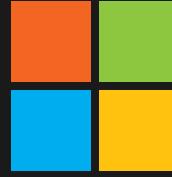
More than AWS &
Google combined





Microsoft Azure

Invent with purpose



Microsoft Azure

미래를
대비하는
설계&개발

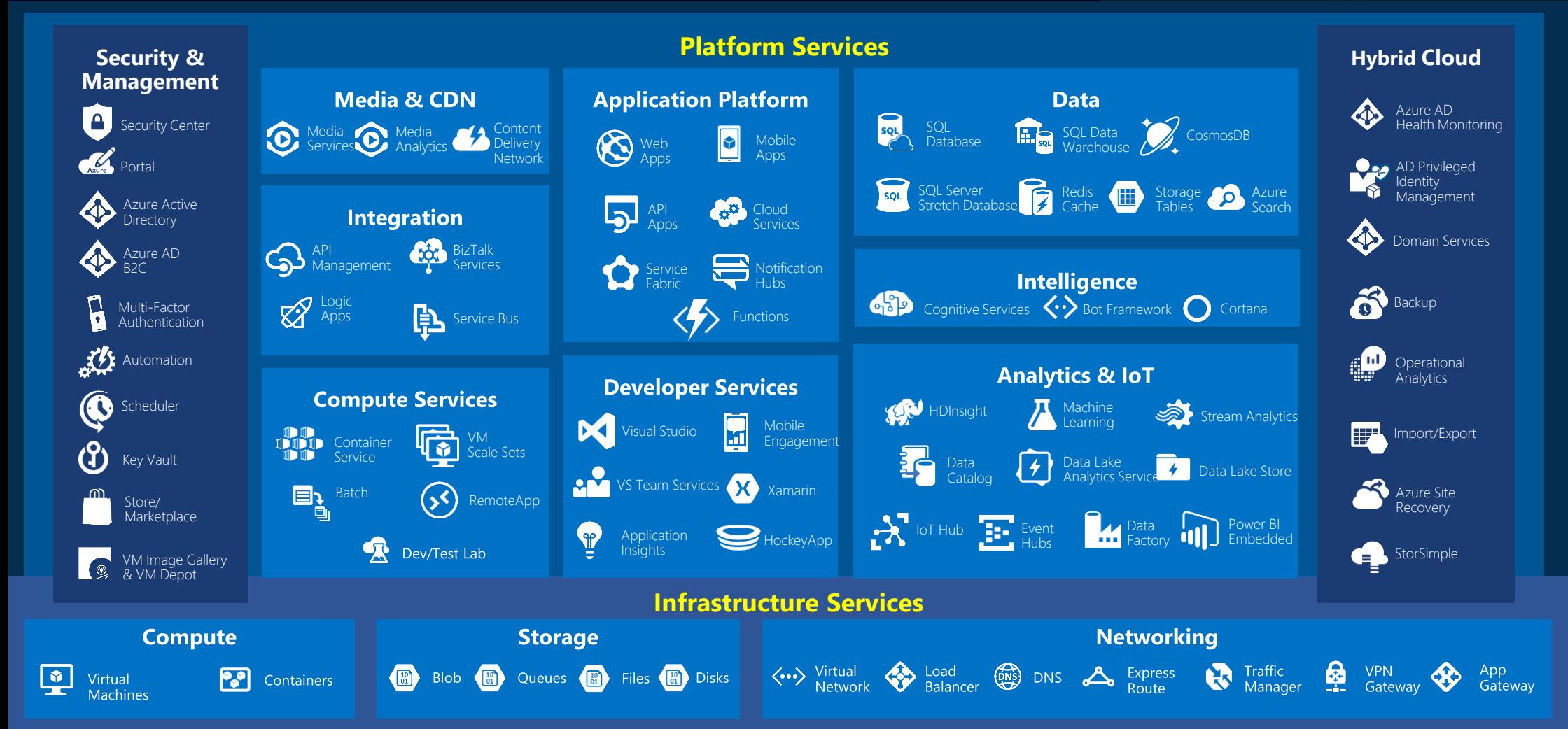
원하는대로
직접 구축

안전하고
Seamless한
하이브리드 운영

신뢰 가능한
클라우드

Microsoft Azure Service

<https://azure.microsoft.com/ko-kr/services/>



Datacenter Infrastructure (66 Regions Announced)

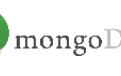


Microsoft Azure - Services Overview



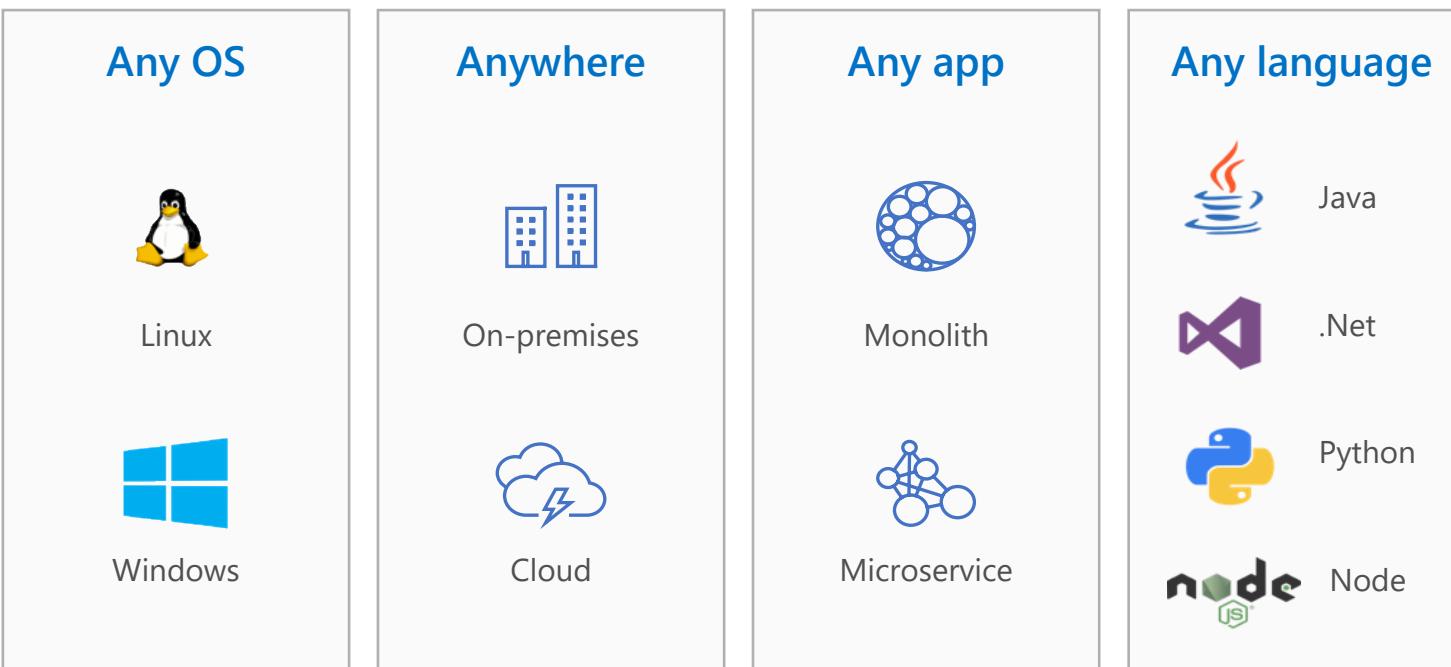
Migration Accelerator	Cloud Services												Cloud Services															
	Virtual Machines (VM)	IaaS v1 & v2	Gallery Images	VM Sizes	VHD Imageability	High Performance Compute (HPC)	Networking & HA	VM Sizes	ASP.NET PHP	Azure SDK Tools	Virtualized Apps - Office 365	Azure AD - Secured Access to	Scheduled & On Demand Batch Jobs	Hyper-V VMs	Template Images	Custom Images	Basic Standard Tiers											
Compute	Windows Server	LINUX	Standard (DS-14)	(D1-4), (D11-14)	Standard (DS-14)	Standard (DS-14)	Multiple NICs	Single/Multi	Standard (D1-11)	Standard (D1-14)	x86/64 Apps	Cloud Collection	Cloud Collection	Hyper-V VMs	Cloud Collection	Cloud Collection	Cloud Collection	Cloud Collection	Cloud Collection	Cloud Collection	Cloud Collection	Cloud Collection	Cloud Collection	Cloud Collection				
Management	Windows Server (Linux)	On-Premise License Availability	Standard (DS-14)	(G1-5)	Premium SSD Storage	Anti Malware Addon	Secure VPN	Virtual Public IP (VIP)	Standard (D1-11)	Standard (D1-14)	Windows	Collection (on Prem & Cloud)	Collection (on Prem & Cloud)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)	Batch (.NET SDK Client & Mgmt)				
Deployment	Docker Containers	Container	Clusters	Runtime	Lifecycle Management	Reliable Services Actors	Health Model	User Segmentation App User Monitoring	Tag Plan	REST API	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services	Cloud Services				
Azure Service Fabric	Windows Server (Linux)	Microservices	Windows Server (Linux)	Windows Server (Linux)	Windows Server (Linux)	Distributed Systems Platform	Reliable Services	User Engagement Platform	Client & Server SDK	API Enable - Data & Services	Policies	Swagger API	PremiumTier	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry			
Application Platform & API	Azure Redis Cache	PaaS	Basic Standard Tiers	Basic Standard Tiers	Basic Standard Tiers	Advanced Key-Value Store	Client SDKs for .NET Python PHP Node Java ASP.NET Session State Provider Scripting Keys with TTL Memcache	Near-instantaneous Response Type-ahead Query Suggestions Faceted Navigation Scoring Profiles Hit Highlighting Tag Boosters	Windows iOS OS Objective C Swift Android	Internal Developers Partners Customers	Throttle Requests Caching Payload Format Usage Quota CORS More...	Swagger API Import Developer Admin Portal Social Identity Azure AD Role-based Access	Multi Region Deployment Unlimited Scale Out VPN Integration	Cloud	Check Pointing Partition Key Stream Offset APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups	Big Data Runtime REST API Stream Offsets APIs NET Framework PowerShell Consumer Groups		
Platform & DevOps	Azure App Services	PaaS	Basic Shared	Basic Standard	Basic Standard	App Service Environments (ASE)	Secure Access to on-premise Corporate Services	App Service Plans (ASP)	Web Apps	Mobile Apps	Logic Apps	API Apps	API Apps	Media Services	Media Services	Media Services	Media Services	Media Services	Media Services	Media Services	Media Services	Media Services	Media Services	Media Services	Media Services			
Infrastructure Services	Azure BizTalk Service	PaaS	Basic Standard	Basic Standard	Basic Standard	Cloud based Integration Service for B2B and EAI scenarios	Created with 2.1 EDI AS2 EDIFACT Messaging	Generic Cloud based Messaging System	Event Hubs - For large scale events ingestion	Service Bus REST API .NET SDK Azure PowerShell Service Bus Explorer	Cloud integrated Backup	Protected Instances	Backup Vault	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery			
Development & Deployment	Azure DocumentDB	PaaS	Basic Professional	Basic Professional	Basic Professional	Build, Share Code, Track Work in the Cloud	Continuous Integration - Complete, Test and Deploy	Choice of IDE - Visual Studio Eclipse for Java Extend to Custom Tools using REST API	Defect Issues Diagnose Exceptions, crashes and Monitor Performance issues	Event Hubs - For large scale events ingestion	Service Bus REST API .NET SDK Azure PowerShell Service Bus Explorer	Cloud integrated Backup	Protected Instances	Backup Vault	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery			
Database & Analytics	Azure Storage	PaaS	Basic Standard	Basic Standard	Basic Standard	Cloud Storage for Blobs Small Data	Cloud Storage for Blobs Large Data Small Data	Cloud Storage for Blobs Large Data Small Data	Cloud Storage for Blobs Large Data Small Data	Event Hubs - For large scale events ingestion	Service Bus REST API .NET SDK Azure PowerShell Service Bus Explorer	Cloud integrated Backup	Protected Instances	Backup Vault	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery				
Networking	Azure Virtual Networks	PaaS v1 & v2	Virtual Networks available free of charge. Pay only for Public & Reserved IP Addresses, VPN/Application gateway	Cloud based Private Network	Cross Premises Connectivity	VPN to VPC connectivity	SDK APIs	Used for P2S S2S Multi Site Multi Site Multi Site	Hosted in Azure Global Network of DNS Servers	HA & Network performance of Apps	Monitoring	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery				
Identity & Access	Azure Active Directory	PaaS	Basic Standard	Basic Standard	Basic Standard	Identity & Access Management in the Cloud	Point-to-Site (P2S)	Site-to-Site (S2S)	VPN to VPC connectivity	SDK APIs	Used for P2S S2S Multi Site Multi Site Multi Site	Hosted in Azure Global Network of DNS Servers	HA & Network performance of Apps	Monitoring	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery			
Management Support	Azure Key Vault	PaaS	Standard F	Standard F	Standard F	Highly scalable Push Notification Engine	Virtual Network	Cross Premises Connectivity	SDK APIs	Used for P2S S2S Multi Site Multi Site Multi Site	Hosted in Azure Global Network of DNS Servers	HA & Network performance of Apps	Monitoring	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery			
App Services	Azure Notification Hub	PaaS	Free Basic	Standard	Standard	Broadcast Messages instantly across platform devices - Windows/JOS, Android, Kindle/Xanax	Native Apps - Windows iOS Android Kindle Xamarin Chrome Apps - Safari browser from Website	Targeted Messaging using Tag based subscriptions	Secure, Key Management in the Cloud	Rapid Scale Global Redundancy Segregated Key Management	Recurring / Scheduled Jobs (sync/async)	Job Collection Jobs Jobs History	Outbound Authentication Support	Simplified Cloud Management with Automation	Global Delivery Network of High Bandwidth	HTTPS support Cache specific content with Query Strings Custom Domain Support	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery									
Management	Azure Key Vault	PaaS	Standard F	Standard F	Standard F	Native Apps - Windows iOS Android Kindle Xamarin Chrome Apps - Safari browser from Website	Scheduled Notifications	Platform Agnostic Notifications works with GCM APNS WNS	Hardware Security Module(HSM) to generate, secure keys, passwords	Rapid Scale Global Redundancy Segregated Key Management	Recurring / Scheduled Jobs (sync/async)	Job Collection Jobs Jobs History	Outbound Authentication Support	Simplified Cloud Management with Automation	Global Delivery Network of High Bandwidth	HTTPS support Cache specific content with Query Strings Custom Domain Support	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery									
Management	Azure Scheduler	PaaS	Free Standard	Standard	Standard	Plugs into Back End systems across Technologies - .NET Node.js PHP Java either on-premise or in Azure	Localization of Messages using Templates	SAS Tokens based authorization to Send Receive ManageHub	Access restricted Audit and activities in HSM Separate keys for Dev Test Production	Rapid Scale Global Redundancy Segregated Key Management	Recurring / Scheduled Jobs (sync/async)	Job Collection Jobs Jobs History	Outbound Authentication Support	Simplified Cloud Management with Automation	Global Delivery Network of High Bandwidth	HTTPS support Cache specific content with Query Strings Custom Domain Support	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery									
Automation	Azure Automation	PaaS	Standard F	Standard F	Standard F	Telemetry Multi tenancy	Device Registration for Notifications - By App By Back End Bulk Modify through File	Multiple NICs	Instance Level Public IP (PIP)	Endpoint Security ACR Remote Access RDS SSH	Recurring / Scheduled Jobs (sync/async)	Job Collection Jobs Jobs History	Outbound Authentication Support	Simplified Cloud Management with Automation	Global Delivery Network of High Bandwidth	HTTPS support Cache specific content with Query Strings Custom Domain Support	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery									
Networking	Azure CDN	PaaS	Standard F	Standard F	Standard F	Telemetry Multi tenancy	Plugs into Back End systems across Technologies - .NET Node.js PHP Java either on-premise or in Azure	Multiple NICs	Secure VPN	Endpoint Security ACR Remote Access RDS SSH	Recurring / Scheduled Jobs (sync/async)	Job Collection Jobs Jobs History	Outbound Authentication Support	Simplified Cloud Management with Automation	Global Delivery Network of High Bandwidth	HTTPS support Cache specific content with Query Strings Custom Domain Support	Cloud Site Recovery	Cloud Site Recovery	Cloud Site Recovery									
Storage	Azure Event Hubs	PaaS	Basic Standard	Standard	Standard	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry	Cloud Scale Telemetry			
Analytics	Azure Stream Analytics	PaaS	Basic Standard	Standard	Standard	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud	Real time Stream Processing in Cloud			
Machine Learning	Azure Machine Learning	PaaS	Standard F	Standard F	Standard F	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning	Machine Learning			
Machine Learning	Azure Data Factory	PaaS	Standard Premium	Standard Premium	Standard Premium	Data Warehouse	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service	Data Warehouse as a Service				
Machine Learning	Azure Databricks	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark	Apache Spark			
Machine Learning	Azure Data Lake Storage	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Analytics	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Intelligence	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Storage Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Storage Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop	Apache Hadoop			
Machine Learning	Azure Data Lake Machine Learning Analytics Gen2	PaaS	Standard Premium	Standard Premium	Standard Premium	Apache																						

선택과 유연성에 따라 다양하고 창의적인 구축 가능

DevOps	Nagios®	 VAGRANT		 GRUNT					
Management	 CHEF™	 puppet labs	 ANSIBLE	 SALTSTACK			 libcloud		
Applications		 Joomla!	 Drupal™		 APPRENDA				
App frameworks & tools	 php	 nodeJS		 .JS	 Ruby	 IJ	 eclipse		
Databases & middleware		 redis	 CLEARDB	 cloudera	 MySQL	 mongoDB		 Couchbase	
Infrastructure			 redhat	 suse		 bitnami	 ORACLE LINUX	 FreeBSD	 docker

컨테이너 기술을 클라우드에서 활용하기

컨테이너 사용 이점

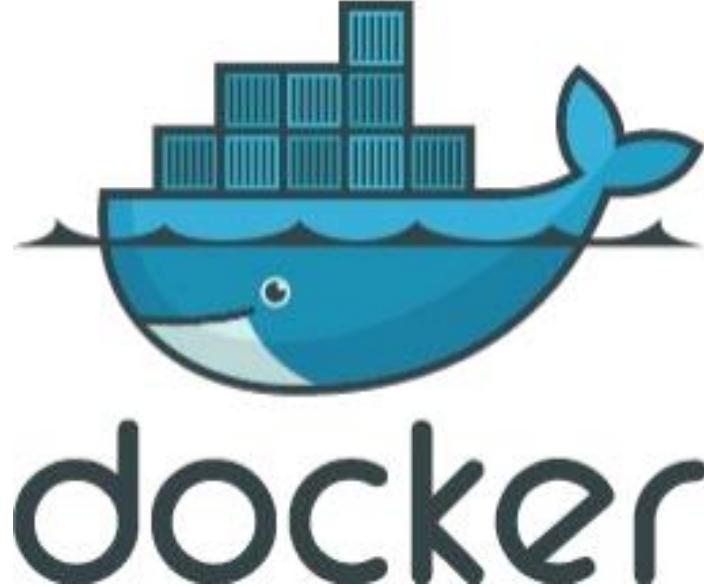


What is Container



- VM보다 가벼운 형식으로 애플리케이션을 pack, ship, run
- 컨테이너는 프로세스 격리를 기반으로 하는 애플리케이션 전달 메커니즘
- Linux Kernel 기술 사용 : cgroups, namespaces + overlay fs + tooling
- 컨테이너 이미지를 사용하면 응용 프로그램 코드, 런타임 및 모든 Dependency들을 Pre-Defined Format으로 제한 가능
- Container는 새로운 것이 아닙니다 - 리눅스 LXC, Solaris Zones, BSD Jails 처럼 기존에 있던 개념!!!
 - ✓ Docker는 기존의 있는 것을 사용하여 빌드하고 관리할 오픈소스 소프트웨어를 만들었음

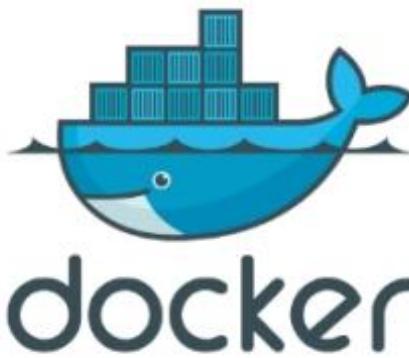
Docker



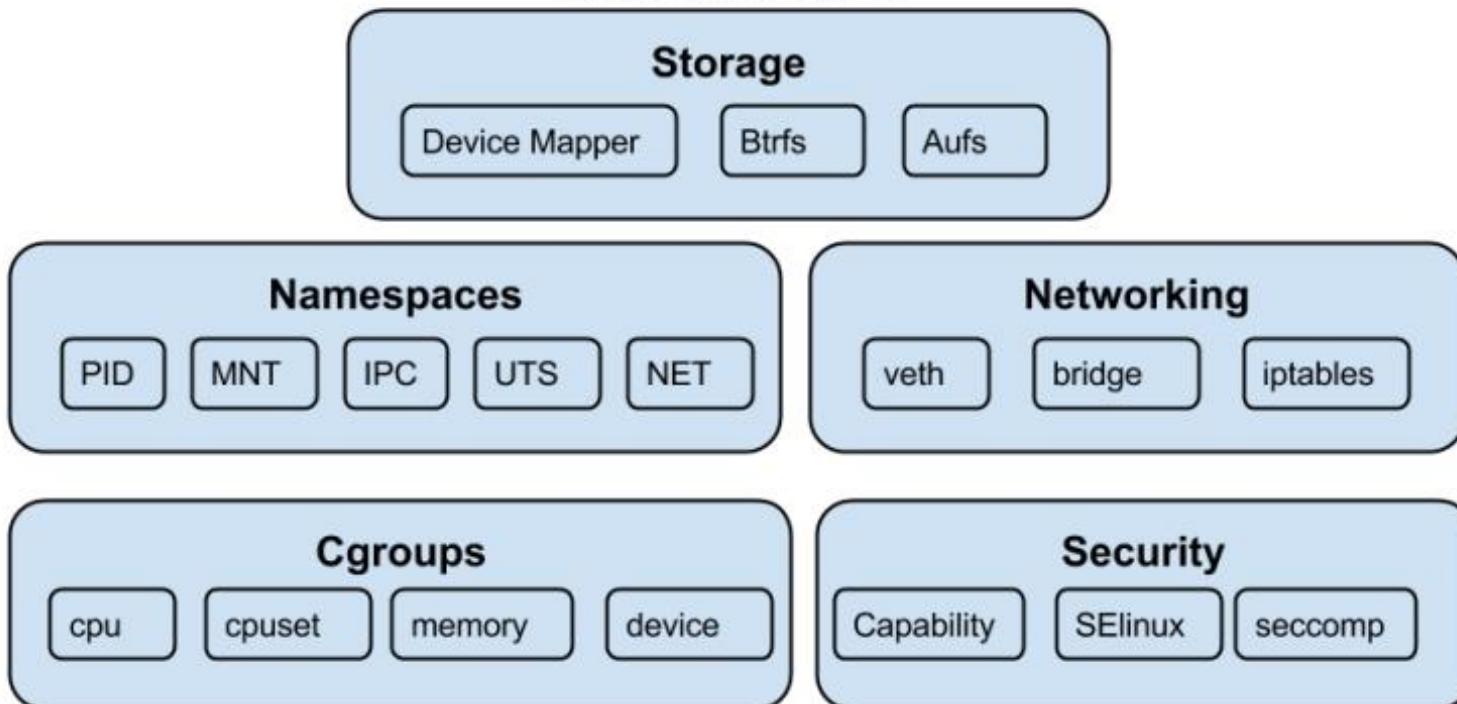
2013년 3월 PyCon Conference – Docker (Solomon Hykes)
컨테이너 기반의 오픈소스 가상화 플랫폼

Docker - Build, Ship, and Run Any App, Anywhere

Docker



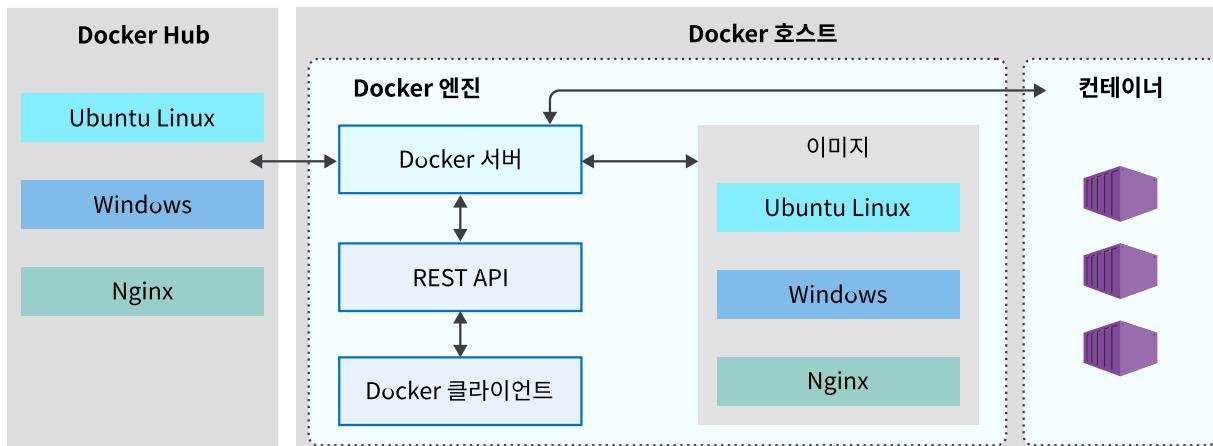
Linux Kernel



Docker 아키텍처

Docker 엔진

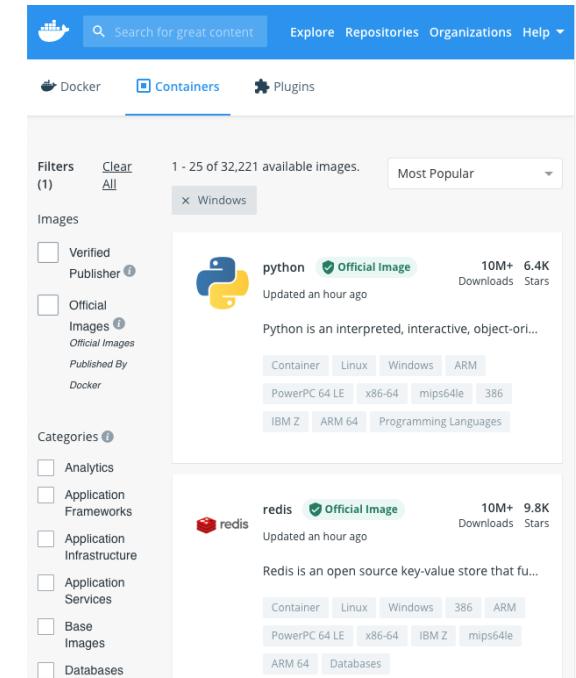
- Docker 클라이언트: “docker” 명령어를 사용하여 REST API를 사용, 로컬 또는 원격 서버에 명령을 보내고 컨테이너를 관리하는데 사용
- Docker 서버: “dockerd”라고 하는 데몬 (Daemon)으로 동작하며, Docker REST API를 통해 클라이언트 요청에 응답
- Docker 오브젝트 (객체): 네트워크, 스토리지 볼륨, 플러그인 등이 컨테이너 배포를 위해 지원되는 항목임



<https://aka.ms/learn-docker-container>

Docker 허브

- Docker 컨테이너 레지스트리로 불리며, 컨테이너 이미지를 저장하고 배포하는데 사용하는 리포지토리



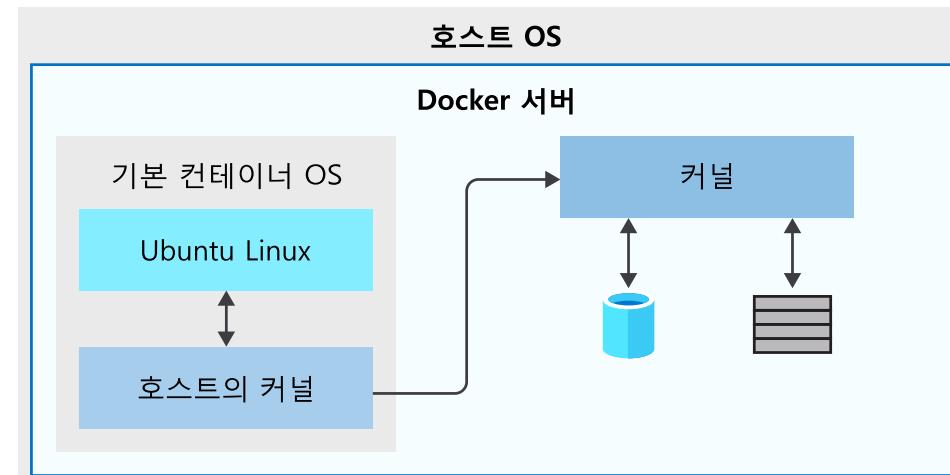
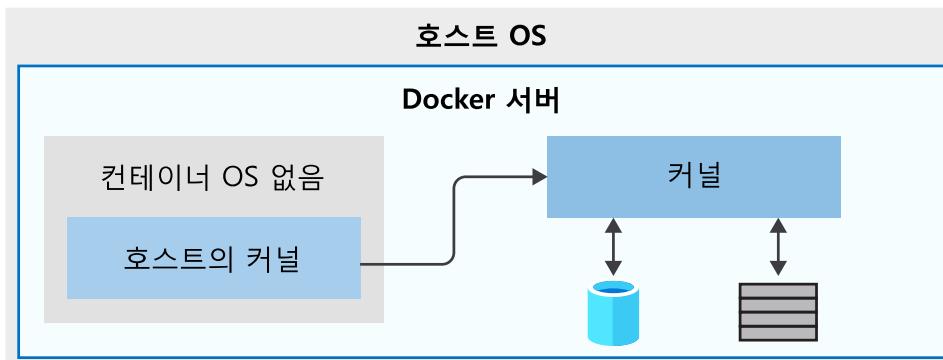
Docker 이미지 작동 방법

호스트 OS

- Docker 엔진이 실행되는 OS
- 호스트 OS 커널을 공유하면서 바이너리 파일이 OS 커널에 직접 액세스할 수 있는 환경인 경우, Docker 컨테이너가 호스트 OS 커널을 공유

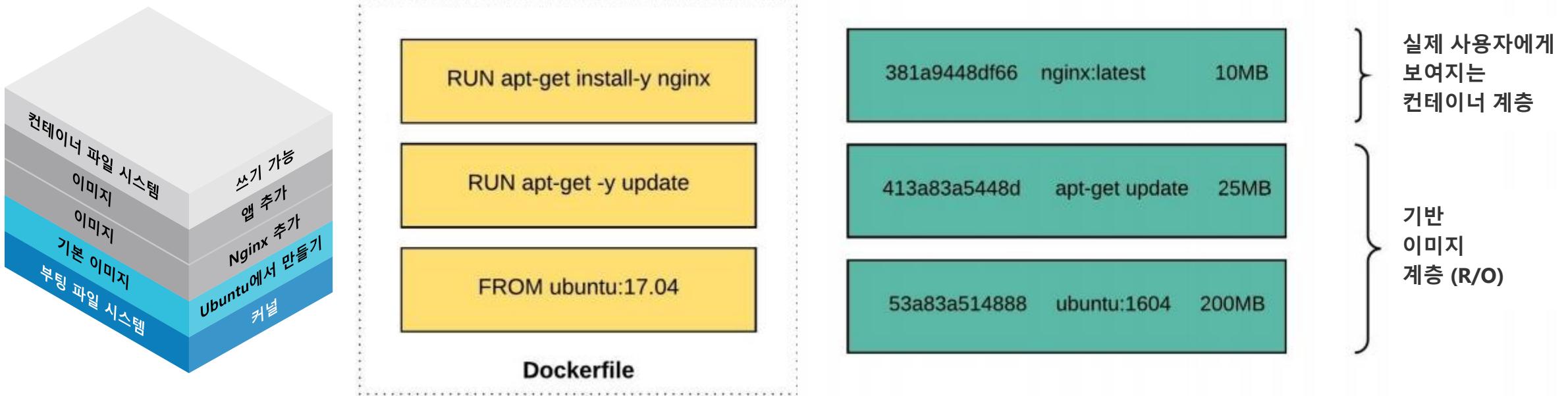
컨테이너 OS

- 패키지된 이미지에 포함된 OS
- Linux 또는 Windows OS를 유연하게 포함 가능
- 호스트 OS와 격리되며 애플리케이션을 배포하고 실행하는 컨테이너 OS를 지정하여, 개발시 실행되는 애플리케이션 환경이 프로덕션과 동일하게 지정 가능 (아래는 Ubuntu 지정)



Layers within a Docker Image

- Docker 이미지는 여러 레이어로 쌓을 수 있는 통합 파일 시스템 (Unionfs)를 사용함
- Multiple Layer로 구성시, top layer는 read/write, 나머지는 read-only
- 도커파일은 텍스트 기반 문서로, 도커 이미지를 자동으로 빌드하기 위한 명령들을 기술함
- 기본 (Base) 이미지를 직접 작성할 수도 있으며, Ubuntu 17.04 등 다른 이미지를 가져와 Parent 이미지로 사용 또한 가능



Dockerfile: ASP.NET Core용 예제

```
# Step 1: Specify the parent image for the new image
```

```
FROM ubuntu:18.04
```

```
# Step 2: Update OS packages and install additional software
```

```
RUN apt -y update && apt install -y wget nginx software-properties-common apt-transport-https \
&& wget -q https://packages.microsoft.com/config/ubuntu/18.04/packages-microsoft-prod.deb -O packages-microsoft-prod.deb \
&& dpkg -i packages-microsoft-prod.deb \
&& add-apt-repository universe \
&& apt -y update \
&& apt install -y dotnet-sdk-3.0
```

```
# Step 3: Configure Nginx environment
```

```
CMD service nginx start
```

```
# Step 4: Configure Nginx environment
```

```
COPY ./default /etc/nginx/sites-available/default
```

```
# STEP 5: Configure work directory
```

```
WORKDIR /app
```

```
# STEP 6: Copy website code to container
```

```
COPY ./website/..
```

```
# STEP 7: Configure network requirements
```

```
EXPOSE 80:8080
```

```
# STEP 8: Define the entry point of the process that runs in the container
```

```
ENTRYPOINT ["dotnet", "website.dll"]
```

<https://aka.ms/learn-docker-container>

주요 Docker 명령어

Bash

```
docker build -t temp-ubuntu .
```

복사

출력

```
Sending build context to Docker daemon 4.69MB
Step 1/8 : FROM ubuntu:18.04
--> a2a15febcd3
Step 2/8 : RUN apt -y update && apt install -y wget nginx software-properties-common apt-transport-h
--> Using cache
--> feb452bac55a
```

복사

콘솔

```
docker images
```

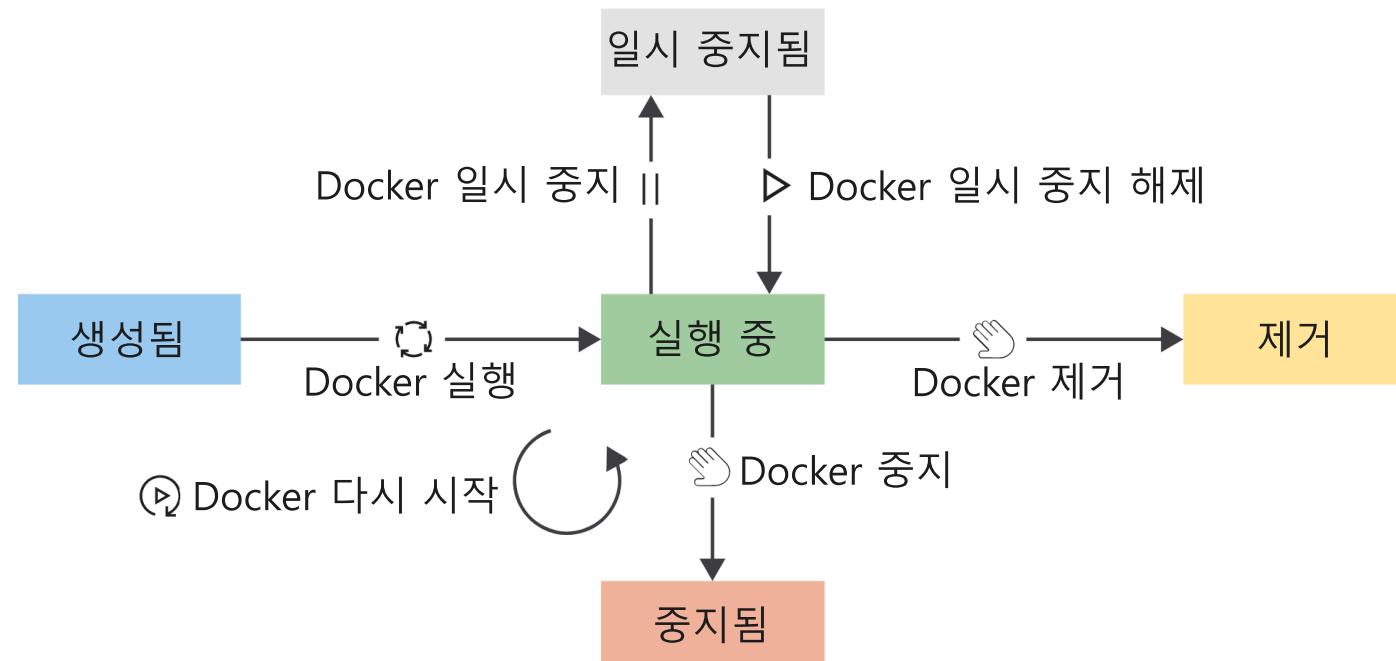
복사

출력

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
tmp-ubuntu	latest	f89469694960	14 minutes ago	1.69GB
tmp-ubuntu	version-1.0	f89469694960	14 minutes ago	1.69GB
ubuntu	18.04	a2a15febcd3	5 weeks ago	64.2MB

복사

Docker 컨테이너 수명 주기



Docker 실습 데모

- URL: <https://bit.ly/dockerbasic>

Docker 설치 및 간단 실습

- 참고: MS Learn을 통해 Docker를 자세히 살펴보시는 것을 추천합니다
 - Docker 컨테이너 소개
- Docker 설치하기 (Ubuntu 20.04 LTS) 공식 [docker.com 설치 안내 링크](https://docs.docker.com/install/)

```
# root 계정 전환
sudo su -

# 도커 설치를 위한 저장소 설치
apt-get update && apt-get -y install apt-transport-https ca-certificates curl gnupg lsb-release

curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /usr/share/keyrings/docker-archive-keyring.gpg

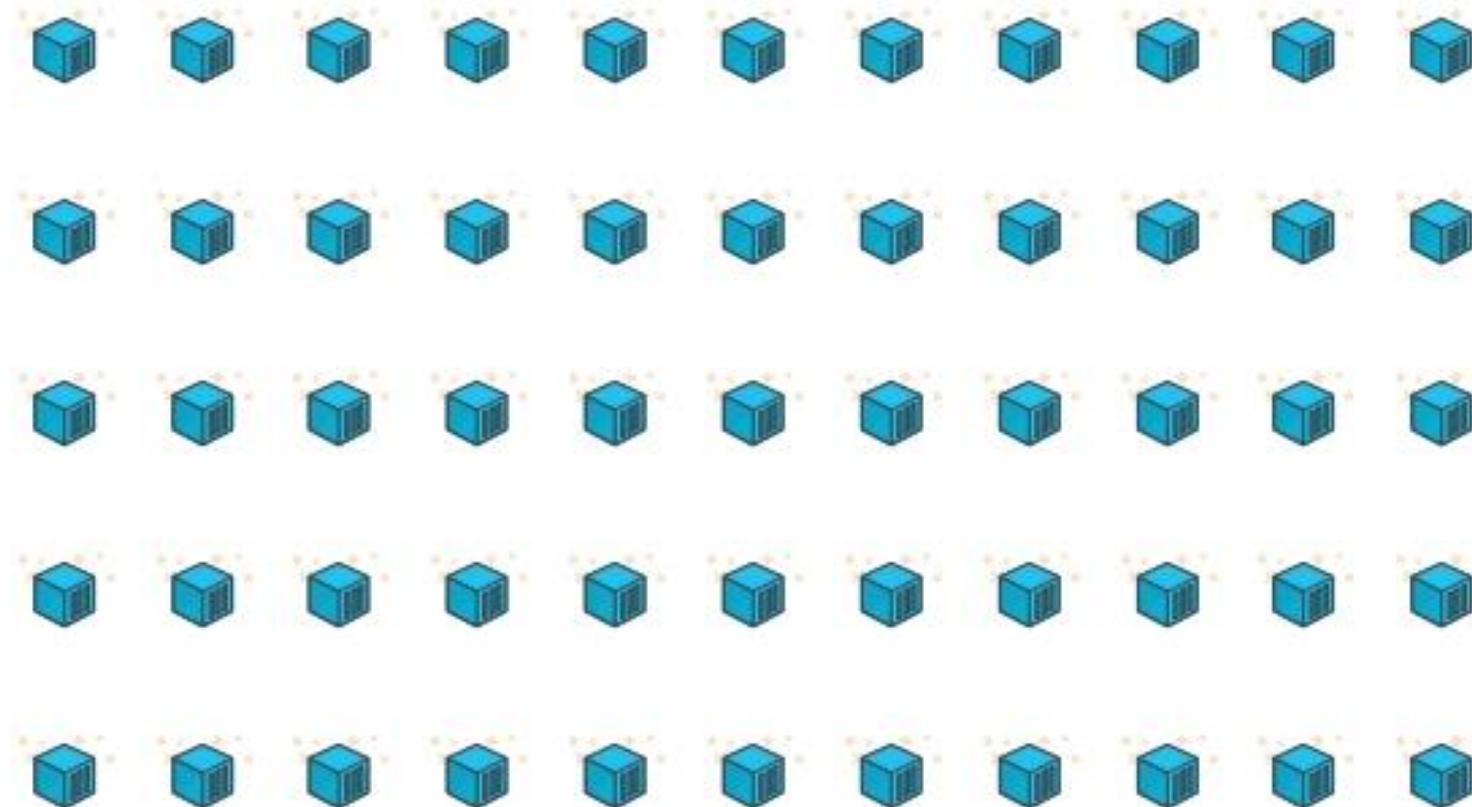
echo \
  "deb [arch=amd64 signed-by=/usr/share/keyrings/docker-archive-keyring.gpg] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null

cat /etc/apt/sources.list.d/docker.list

# 도커 설치
apt-get update && apt-get -y install docker-ce docker-ce-cli containerd.io
```

(그런데..)

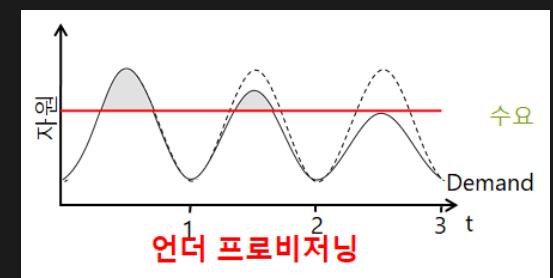
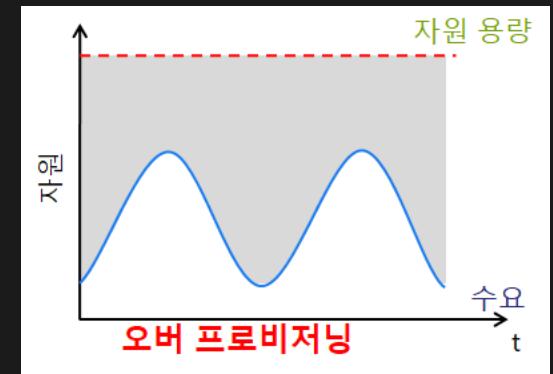
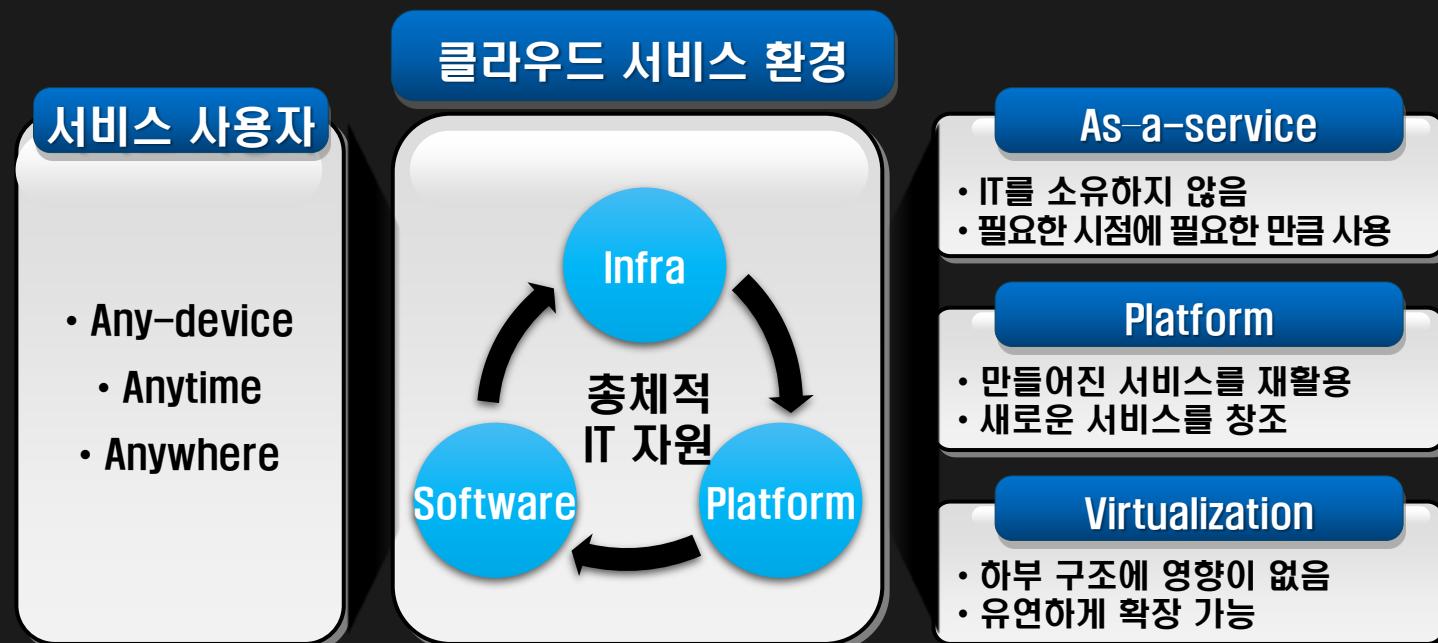
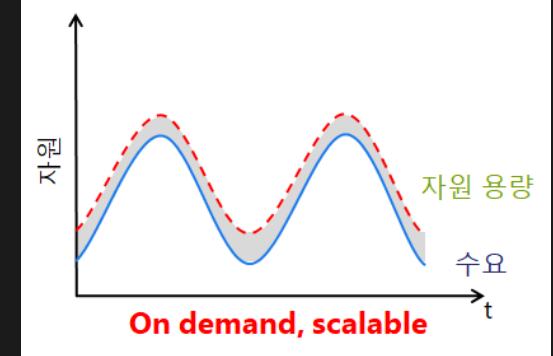
- Container가 1개가 아닌, 엄청 많아지는 경우엔...
=> 점점 늘어만 가는 Container, 감당 할 수 있을까요?!



3. 클라우드 네이티브와 컨테이너 & 쿠버네티스 기술 트렌드

클라우드의 발전

- 가상화 기술에 기반한 유연성
- 데이터 센터에 있는 물리 자원에 대한 서비스화
- 사용자: 필요한 만큼 사용 (경제적)



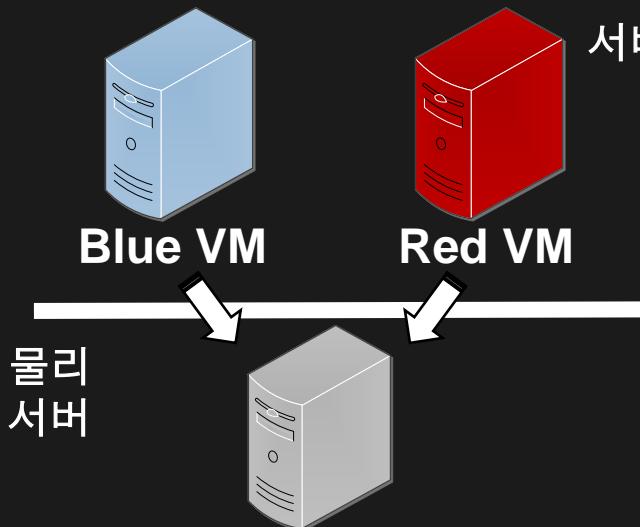
클라우드 컴퓨팅: 경제성 - 규모의 경제

- 소규모로 운영하는 것과 비교하여 대규모로 운영 할 때 비용이 적게 들고 효율적으로 작업 할 수 있는 능력
- Microsoft, Google 및 Amazon Web Services (AWS)와 같은 클라우드 제공 업체는 매우 큰 비즈니스이므로 규모의 경제 이점을 활용한 이러한 혜택을 고객에게 전달할 수 있다.

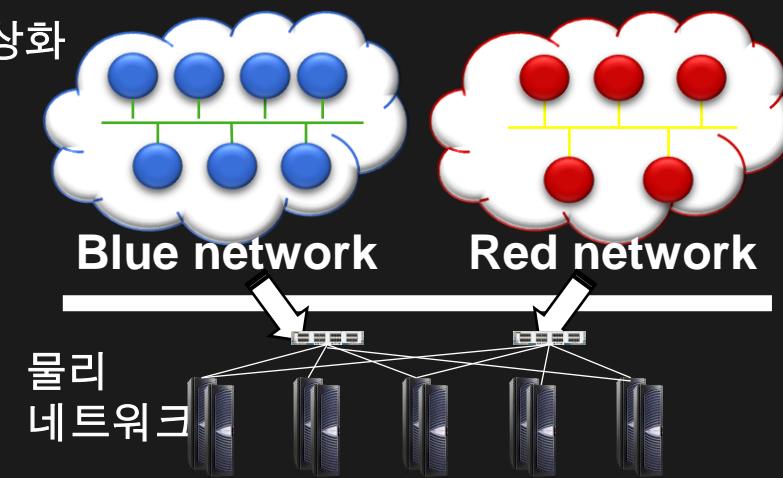


클라우드 컴퓨팅과 가상화 기술 - (1)

- 서버 가상화 기술은 클라우드에서 물리 자원을 가상화하는 핵심 기술입니다
 - 하이퍼바이저: VMware ESXi, Citrix XenServer, Microsoft Hyper-V, ...
 - 하드웨어 지원: Intel VT/VT-x, AMD-v
- 물리 자원을 “가상화”하여 사용자에게 필요한 만큼 제공하기 위한 여러 가상화 기술이 있습니다
 - 예: 네트워크 가상화, 스토리지 가상화, ...



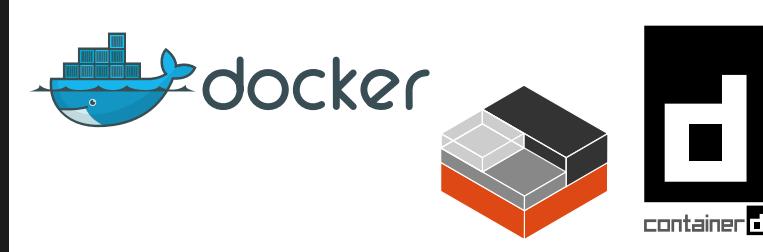
서버 가상화 vs. 네트워크 가상화



클라우드 컴퓨팅과 가상화 기술 - (2)

- 자원, 즉 리소스를 사용하고 소비하는 방식이 바뀌었습니다.
 - 클라우드 이전: 필요하면 구입
 - 서버 위치, 서버 및 장비 구입 비용, 수명, 전기세
 - 클라우드 등장
 - 시간당 지불
 - 사용한 만큼 지불
 - 빠르게...
 - 유연하게...
- 클라우드 서비스는 서비스 유형에 따라 다음과 같이 구분됩니다.
 - IaaS: 인프라를 서비스로 제공
 - PaaS: (개발) 플랫폼을 서비스로 제공
 - SaaS: 소프트웨어를 서비스로 제공
- 비즈니스와 기술이 보다 다양해지고 복잡해지면서... ← **클라우드 네이티브 등장 배경**
 - 전통적인 IaaS/PaaS/SaaS에서 벗어난 as-a-service (XaaS): Function, Container, ...
 - 클라우드를 보다 잘 활용 가능한 기술, 아키텍처의 필요성

컨테이너 발전과 클라우드 컴퓨팅 네이티브 재단 (CNCF) 등장



ANNOUNCEMENTS

New Cloud Native Computing Foundation to drive alignment among container technologies

Posted on June 21, 2015

AT&T, Box, Cisco, Cloud Foundry Foundation, CoreOS, Cycle Computing, Docker, eBay, Goldman Sachs, Google, Huawei, IBM, Intel, Joyent, Kismatic, Mesosphere, Red Hat, Switch SUPERNAP, Twitter, Univa, VMware and Weaveworks join new effort to build and maintain cloud native distributed systems

SAN FRANCISCO, Calif., July 21, 2015 – The Linux Foundation, the nonprofit organization dedicated to accelerating the growth of Linux and collaborative development, today announced the Cloud Native Computing Foundation.



CNCF에서 정의하는 “클라우드 네이티브”

<https://github.com/cncf/toc/blob/main/DEFINITION.md#한국어>

클라우드 네이티브 기술은 조직이 퍼블릭, 프라이빗, 그리고 하이브리드 클라우드와 같은 현대적이고 동적인 환경에서 확장 가능한 애플리케이션을 개발하고 실행할 수 있게 해준다. 컨테이너, 서비스 메쉬, 마이크로서비스, 불변(Immutable) 인프라, 그리고 선언형(Declarative) API가 이러한 접근 방식의 예시들이다.

이 기술은 회복성, 관리 편의성, 가시성을 갖춘 느슨하게 결합된 시스템을 가능하게 한다. 견고한 자동화 기능을 함께 사용하면, 엔지니어는 영향이 큰 변경을 최소한의 노력으로 자주, 예측 가능하게 수행할 수 있다.

Cloud Native Computing Foundation은 벤더 중립적인 오픈 소스 프로젝트 생태계를 육성하고 유지함으로써 해당 패러다임 채택을 촉진한다. 우리 재단은 최신 기술 수준의 패턴을 대중화하여 이런 혁신을 누구나 접근 가능하도록 한다.

“클라우드 네이티브”를 위한 여정 (Trail Map)

1. CONTAINERIZATION

- Commonly done with Docker containers
- Any size application and dependencies (even PDP-11 code running on an emulator) can be containerized
- Over time, you should aspire towards splitting suitable applications and writing future functionality as microservices



3. ORCHESTRATION & APPLICATION DEFINITION

- Kubernetes is the market-leading orchestration solution
- You should select a Certified Kubernetes Distribution, Hosted Platform, or Installer: cncf.io/ck
- Helm Charts help you define, install, and upgrade even the most complex Kubernetes application



CNCF Graduated

CNCF Graduated

2. CI/CD

- Setup Continuous Integration/Continuous Delivery (CI/CD) so that changes to your source code automatically result in a new container being built, tested, and deployed to staging and eventually, perhaps, to production
- Setup automated rollouts, roll backs and testing
- Argo is a set of Kubernetes-native tools for deploying and running jobs, applications, workflows, and events using GitOps paradigms such as continuous and progressive delivery and MLOps



4. OBSERVABILITY & ANALYSIS

- Pick solutions for monitoring, logging and tracing
- Consider CNCF projects Prometheus for monitoring, Fluentd for logging and Jaeger for Tracing
- For tracing, look for an OpenTracing-compatible implementation like Jaeger



CNCF Graduated



CNCF Graduated



CLOUD NATIVE TRAIL MAP

The Cloud Native Trail Map has a larger number of options. The Cloud Native Trail Map is a recommended step for learning about services, cloud native technologies. At each step, you can choose a vendor-supported offering or do it yourself, and every step of the way is optional based on your circumstances.

HELP ALONG THE WAY

A. Training and Certification

- Consider training offerings from CNCF and then take the exam to become a Certified Kubernetes Administrator or a Certified Kubernetes Application Developer.

B. Consulting Help

- If you're getting started with Kubernetes and the surrounding ecosystem, consider leveraging a Kubernetes Certified Service Provider.

C. Join CNCF's End User Community

- For companies that don't offer cloud native services externally:

WHAT IS CLOUD NATIVE?

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

The Cloud Native Computing Foundation seeks to drive adoption of this paradigm by fostering and sustaining an ecosystem of open source, vendor-neutral projects. We democratize state-of-the-art patterns to make these innovations accessible for everyone.

I.cncf.io
v20200501



1. CONTAINERIZATION

- Commonly done with Docker containers
- Any size application and dependencies (even PDP-11 code running on an emulator) can be containerized
- Over time, you should aspire towards splitting suitable applications and writing future functionality as microservices



3. ORCHESTRATION & APPLICATION DEFINITION

- Kubernetes is the market-leading orchestration solution
- You should select a Certified Kubernetes Distribution, Hosted Platform, or Installer: cncf.io/ck
- Helm Charts help you define, install, and upgrade even the most complex Kubernetes application



4. OBSERVABILITY & ANALYSIS

- Pick solutions for monitoring, logging and tracing
- Consider CNCF projects Prometheus for monitoring, Fluentd for logging and Jaeger for Tracing
- For tracing, look for an OpenTracing-compatible implementation like Jaeger



5. SERVICE DISCOVERY, DISSEMINATION, & MESSAGING

- Consul is a service and flexible tool that is useful for service discovery
- Etsy's Hystrix and Netflix's Eureka enable service mesh architecture
- They offer health checking, routing, and load balancing



7. DISTRIBUTED DATABASE & STORAGE

When you need more resilience and availability than what you get from a single or a pair of servers, it is a good option to run MySQL in a stateless, sharding, sharding, Rock is a storage orchestrator that integrates a diverse set of storage solutions into Kubernetes. Serving as the 'brain' of Kubernetes, it provides a reliable way to store data across a cluster of machines. HKV is a high-performance distributed transactional key-value store written in Rust.



9. CONTAINER REGISTRY & RUNTIME

- Harbor is a registry that stores, signs, and scans content. You can use alternative container runtimes. The most common, both of which are CNCF-compliant, are container and CNCF.



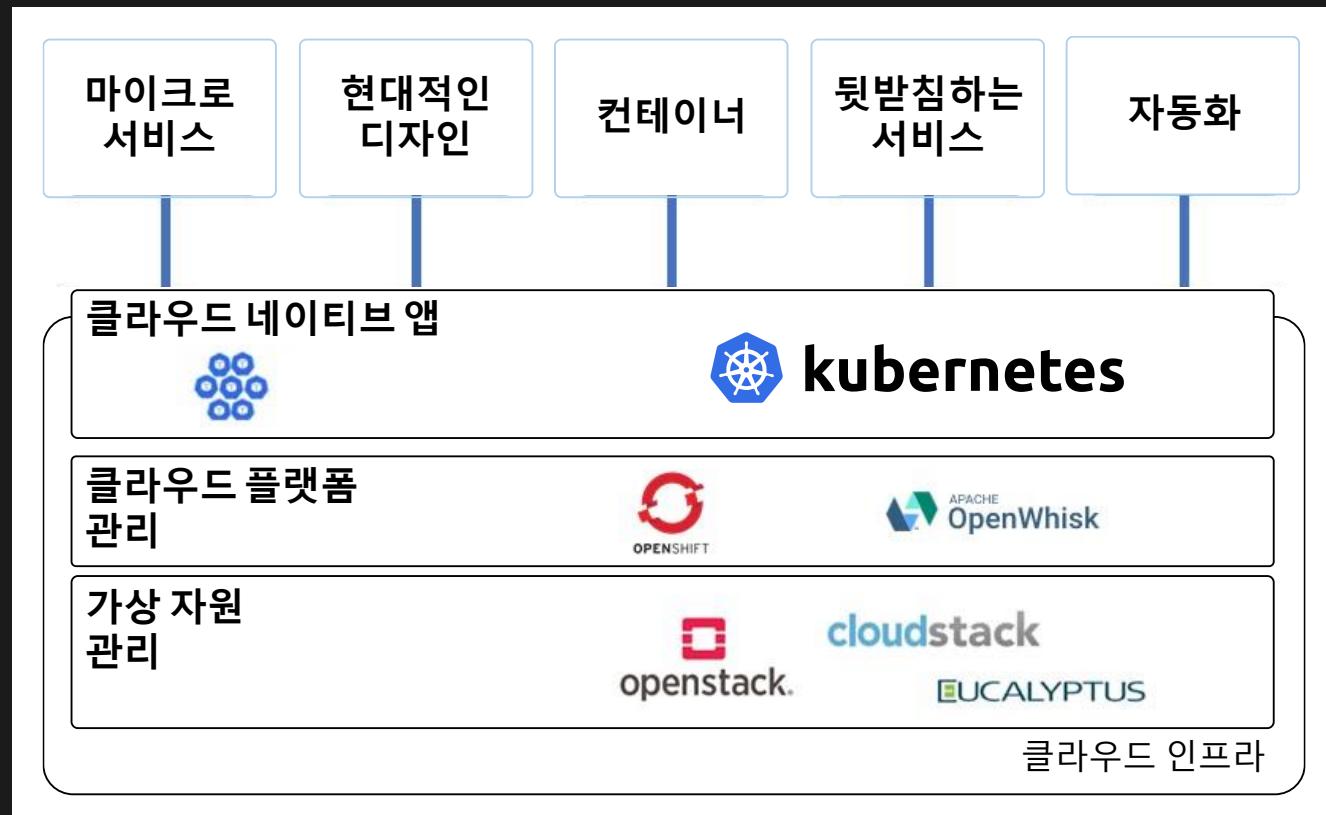
10. SOFTWARE DISTRIBUTION

- If you need to do secure software distribution, evaluate Notary. It implements a tamper-evident update framework.



클라우드 네이티브와 오픈 소스

- 다양한 오픈 소스들이 “클라우드 네이티브” 각 분야에 존재
- 그 중, 쿠버네티스가 클라우드 컴퓨팅 네이티브 재단 (CNCF)에서 직접 주도한 첫 번째 “Graduated Project”



ANNOUNCEMENTS

Cloud Native Computing Foundation announces Kubernetes® as first graduated project

Posted on March 6, 2018

Container orchestration system widely deployed at scale with numerous global organizations

Kubernetes(k8s)란?

Kubernetes: “컨테이너화된 응용 프로그램에 대한 자동화된 배포, 확장, 그리고 관리를 위한 오픈 소스 소프트웨어”

그리스어로 κυβερνήτης 입니다 – 배에 있는 키잡이 (Helmsman)를 의미합니다.

Docker 컨테이너가 항구/해안을 테마로 했던 것과 비슷하게, **Kubernetes**는 컨테이너가 실어지는 배 운항을 담당하는 항해사를 테마로 합니다..

CNCF (클라우드 네이티브 컴퓨팅 재단)에서 첫 번째 Graduated Project 오픈 소스

History (짧은 역사)

Google에서 Borg를 오픈 소스화 + 지속적인 기여 중

Kubernetes v1.0: 2015년 7월 21일 릴리즈 (Founder: Joe Beda, Brendan Burns, Craig McLuckie)

GitHub를 메인 저장 공간으로 사용 중. 기여자: >1,700;
매 3-6개월마다 릴리즈 중

Kubernetes 관련 자세한 배경 & 아이디어:

[Large-scale cluster management at Google with Borg](#) 논문 참고





Pets

Legacy Infrastructure

Pets are given names like grumpycat.petstore.com

They are unique, lovingly hand raised and cared for
When they get ill, you nurse them back to health

Infrastructure is a permanent fixture in the data center

Infrastructure takes days to create, are serviced weekly,
maintained for years, and requires migration projects to move

Infrastructure is modified during maintenance hours and
generally requires special privileges such as root access

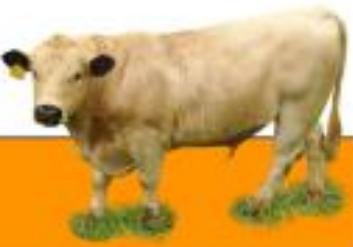
Infrastructure requires several different teams to coordinate and
provision the full environment

Infrastructure is static, requiring excess capacity to be dormant
for use during peak periods of demands

Infrastructure is an capital expenditure that charges a fix amount
regardless of usage patterns



Cattle



Cloud-Friendly Infrastructure

Cattle are given numbers like 10200713.cattlerancher.com

They are almost identical to other cattle
When they get ill, you replace them and get another

Infrastructure is stateless, ephemeral, and transient

Infrastructure is instantiated, modified, destroyed and recreated
in minutes from scratch using automated scripts

Infrastructure uses version-controlled scripts to modify any
service without requiring root access or privileged logins

Infrastructure is self-service with the ability to provision
computing, network and storage services with a single click

Infrastructure is elastic and scales automatically, expanding
and contracting on-demand to service peak usage periods

Infrastructure is a operating expenditure that charges only for
services when they are consumed



Kubernetes

- Phi-Beta-Kappa: Philsophia Biou
Kubernetes (Love of Wisdom Pilots
life)



kubernetes



“컨테이너”로 실제 서비스 & 운영까지

Kubernetes (쿠버네티스): 앱 개발 & 관리 전반에서 컨테이너를 오케스트레이션

다양하게 선택 & 사용

Kubernetes is in production for
global companies across industries¹

Capital One	eBay	SAP
New York Times	Pokémon Go	Spotify

Vendor-neutral

A **variety of cloud providers**
offer robust Kubernetes support

Azure	AWS
VMWare	Red Hat

커뮤니티 지원

There's a **huge community** of active
contributors supporting Kubernetes³

24,000 contributors since 2016	1.1 million contributions since 2016
--------------------------------	--------------------------------------

¹Kubernetes.io. “Kubernetes User Case Studies.” ²CNCF. “Kubernetes Is First...” ³CNCF. Keynote address.



웨이브, Azure로 글로벌 서비스부터 디지털 트랜스포메이션까지 유연하게 대응

웨이브의 서비스는 컨테이너 중심의 마이크로서비스로 개발, 운영되고 있습니다. 모든 기능이 컨테이너 기반으로 설계되어 있고, 450여 개의 마이크로 서비스가 맞물려가면서 서비스로 제공됩니다. 이용자가 스마트폰에서 웨이브 앱을 띄우면 뒤에서 각 마이크로서비스 요소들이 조각처럼 따라 붙으면서 이용자에 맞춰진 전체 화면이 맞춰지는 방식입니다.

모든 요소들이 마이크로서비스로 나뉘어 있다 보니 새로 서비스를 추가하기 쉬울 뿐 아니라 마이크로서비스 하나하나를 수정하고 개선하는 것도 자연스럽습니다. 마치 블록을 맞추듯 서비스가 구성되고, 개발 부서에서는 개별 블록들에 역할을 만들어 끼워넣기만 하면 됩니다.

웨이브는 이 컨테이너 구조를 위해 서비스 초기부터 자체적으로 쿠버네티스 환경을 만들어서 쓰고 있었습니다.

대외/대내 서비스 무관하게 전사 모든 IT 환경을 마이크로소프트 Azure로 옮기기로 결정한 뒤 서비스 형태의 쿠버네티스 환경인 Azure Kubernetes Service를 쓰기 시작했습니다.

조휘열 웨이브 플랫폼기술본부장은 **클라우드 환경에 대한 안정성과 유연성을 높게 샀습니다.**

컨테이너 방식의 구조가 안정되면서 특히 개발 환경의 자유도가 높아졌습니다. 개발자들을 뽑을 때 가장 애를 먹는 부분이 전문 개발 영역이 있기 때문인데, 노드JS부터 자바, C#, 그리고 구글의 고 등의 언어를 모두 활용할 수 있습니다.

개발자는 각자의 방식으로 컨테이너를 개발하고 Azure Kubernetes Service에 적용하기만하면 됩니다. 개발 언어에 대한 제약 때문에 유능한 개발자를 놓치지 않을 수 있을 뿐 아니라 각자 손에 익은 최적의 환경에서 일을 할 수 있기 때문에 업무 효율도 높아집니다.

무엇보다 각 마이크로서비스들의 성격과 역할이 명확하기 때문에 개발과 운영 과정이 투명하게 보이고, 소스 관리부터 개발, 배포 등 전 과정에서 실수가 생길 여지가 줄어듭니다. 장기적인 서비스의 개선과 유지보수에도 유리합니다.

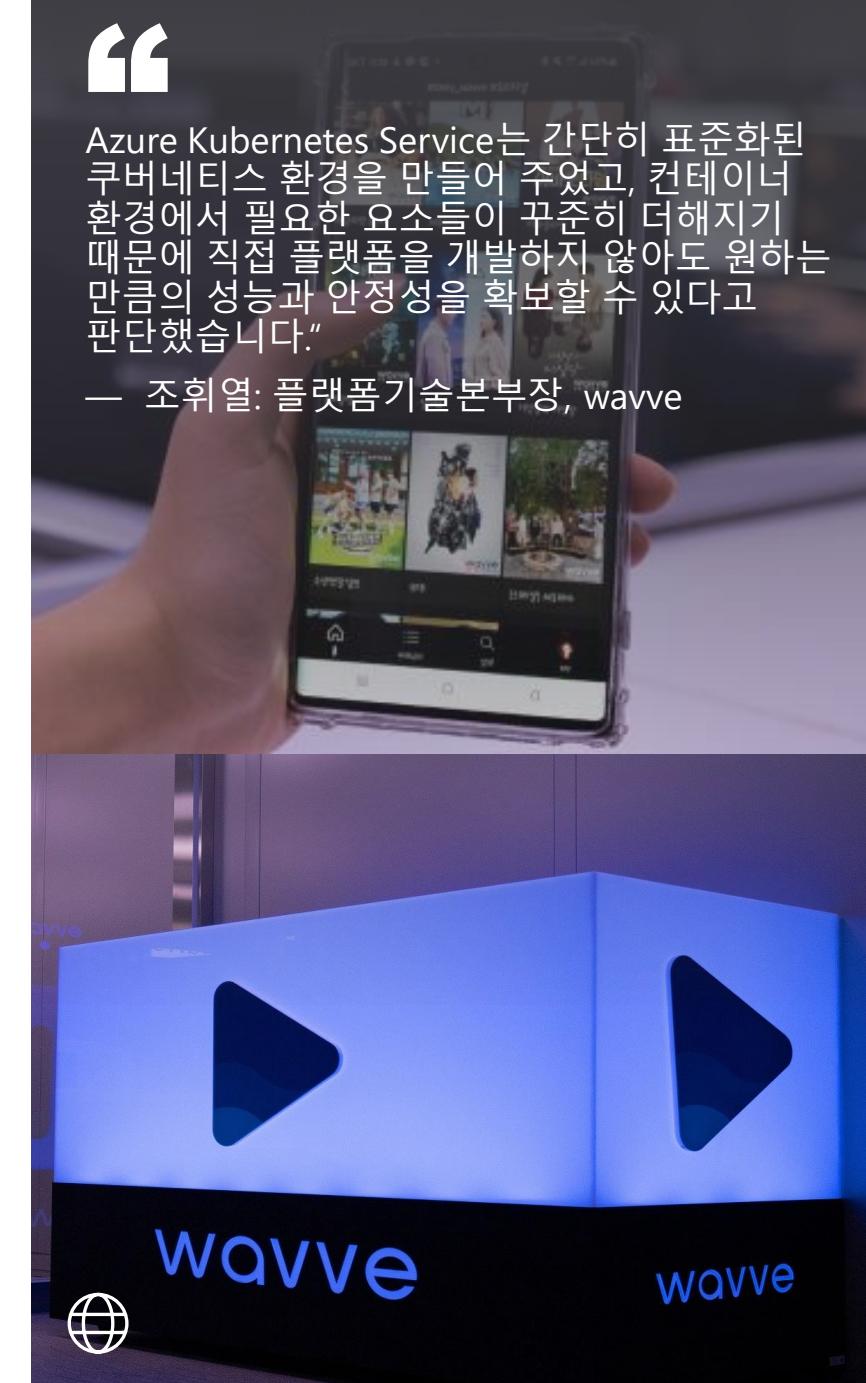
이 때문에 1년 전의 웨이브와 지금 웨이브는 전혀 다릅니다. 개별 컨테이너가 계속해서 진화하기 때문에 연초의 웨이브 서비스와 6개월 뒤의 웨이브는 소스가 20% 이상 달라졌습니다. 그만큼 활발하게 개발이 이뤄지고 있다는 이야기입니다.

또한 Azure는 웨이브의 방대하고 짜임새 있는 쿠버네티스 환경을 온프레미스 이상으로 자연스럽게 흡수했습니다.

“

Azure Kubernetes Service는 간단히 표준화된 쿠버네티스 환경을 만들어 주었고, 컨테이너 환경에서 필요한 요소들이 꾸준히 더해지기 때문에 직접 플랫폼을 개발하지 않아도 원하는 만큼의 성능과 안정성을 확보할 수 있다고 판단했습니다.”

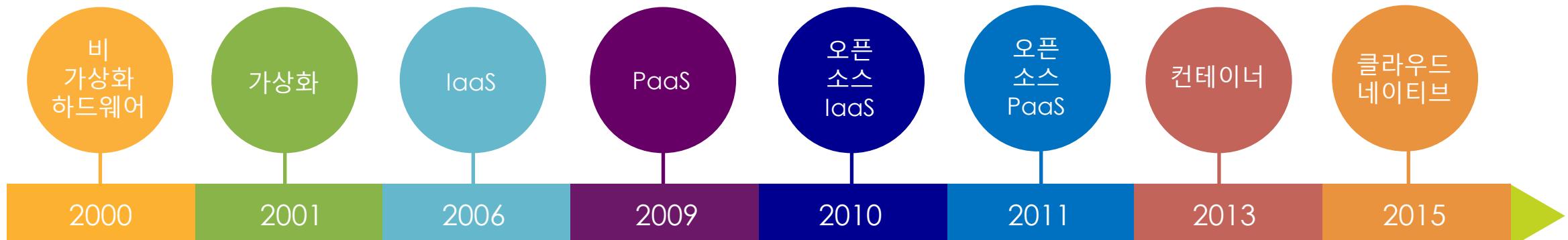
— 조휘열: 플랫폼기술본부장, wavve



가상화부터 “클라우드 네이티브”까지



- 클라우드 네이티브 컴퓨팅에서 사용하는 오픈 소스
소프트웨어 스택:
 - 애플리케이션을 마이크로서비스로 분할,
 - 각 파트를 자체 컨테이너에 패키징 및 해당
컨테이너를 동적으로 오케스트레이션하여 리소스
사용을 최적화



(출처: Cloud Native Computing Foundation)



마이크로소프트 & 컨테이너에서의 변화

Brendan Burns, co-founder of Kubernetes joins
Microsoft Azure team

by Pradeep  @pradeepviswaw Jul 11, 2016 at 18:36 GMT



Brendan Burns, Software Engineer and a founder of Kubernetes at Google is joining Microsoft. Brendan will be joining Azure team where he will be working as development manager for Azure Resource Manager and he will continue to work on Kubernetes too.

 **brendandburns**
@brendandburns

Big changes for me! Tomorrow I start at Microsoft Azure.

Continuing to work on Kubernetes and helping with Azure Resource Manager and more.

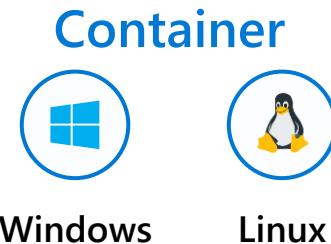
Heart icon: 315 | 9:15 AM - Jul 11, 2016 | i | >

Comment icon: 171 people are talking about this | >

2016년 7월,
Kubernetes Founder 중
1명인 Brendan Burns,
마이크로소프트로

(이후 정말 많은 변화가...)

기존 WebApp에 대한 컨테이너
지원, IoT, 머신 러닝 서비스
컨테이너 지원 + 쉬운 쿠버네티스
연동 등 컨테이너 환경에 최적인
“Azure” 클라우드로 변신 중



Azure Kubernetes Service (AKS)

오픈 소스 Kubernetes 사용 & 운영을 직접 Microsoft에서 “관리”

Microsoft Azure

홈 > 새로 만들기 > Kubernetes Service

Overview - Kubernetes Dashboard

127.0.0.1:8001#!/overview?namespace=default

kubernetes

Search

+ CREATE

Overview

Cluster Workloads

Namespaces
Nodes
Persistent Volumes
Roles
Storage Classes

Namespace: default

Workloads Statuses

- Deployments: 100.00%
- Pods: 100.00%
- Replica Sets: 100.00%

Deployments

Name	Labels	Pods	Age	Images
gs-spring-boot-docker	run: gs-spring-boot-docker	1 / 1	22 hours	ianaksspringwinregistry.azurecr.io/gs...

Pods

Name	Node	Status	Restarts	Age
gs-spring-boot-docker-7c6c4cdcc5-jvbm	aks-nodepool1-12766016-0	Running	0	22 hours

Replica Sets

Name	Labels	Pods	Age	Images
gs-spring-boot-docker-7c6c4cdcc5	pod-template-hash: 7c6c4cdcc5 run: gs-spring-boot-docker	1 / 1	22 hours	ianaksspringwinregistry.azurecr.io/gs...

Resource: Kubernetes & AKS 관련 정보

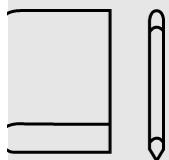
Kubernetes 101 Docs

aka.ms/ko-kr/LearnAKS (한글 문서)



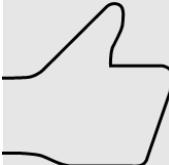
Case studies

aka.ms/aks/casestudy



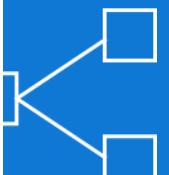
Best practices

aka.ms/ko-kr/aks/bestpractices
(한글 문서)



Microservices architecture

aka.ms/ko-kr/aks/microservices
(한글 문서)



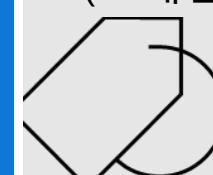
Hear from experts

aka.ms/k8s/lightboard
(Brendan Burns, Kubernetes
Founder)



Try for free

aka.ms/ko-kr/aks/trial
(12개월 체험 서비스)



Feedback on the roadmap? Tell us at <https://aka.ms/aks/feedback>

Finished!

THANK
YOU
very much!