



# 멀티/분산 클라우드, 차세대 클라우드를 향한 도전과 기회

- 클라우드바리스타 커뮤니티 제9차 컨퍼런스 -

MC-Meta

## 멀티 클라우드 메타데이터 통합 관리 기술

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박재홍

시나몬 (Cinnamon) 한잔 어떠세요 ?

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## 클라우드바리스타 커뮤니티 제9차 컨퍼런스

### MC-Meta 개요

시나몬 (Cinnamon) 한잔 어떠세요 ?



# MC-Meta = 멀티클라우드용 다나와

MC-META

Catalog

Compute

Storage

Statistics

etri

Logout

Cloud Catalog

SEARCH FOR SERVICE CATALOGS OFFERED BY CLOUD SERVICE PROVIDERS

Search Options

☒

AWS

☒

Azure

☒

GCP

☒

Alibaba

compute

Alibaba

Elastic Compute Service

HIGH-PERFORMING VIRTUAL SERVERS

Alibaba

Compute Nest

AN APPLICATION MANAGEMENT SERVICE FOR SERVICE PROVIDERS AND CUSTOMERS

Alibaba

Batch Compute

LARGE-SCALE BATCH PROCESSING

Alibaba

Function Compute

RUN YOUR CODE ENVIRONMENT

AWS

Savings Plans

SAVE UP TO 72% ON COMPUTE USAGE WITH FLEXIBLE PRICING

AWS

Amazon EC2 Auto Scaling

SCALE COMPUTE CAPACITY TO MEET DEMAND

AWS

AWS Fargate

SERVERLESS COMPUTE FOR CONTAINERS

AWS

AWS Comprehend

IDENTIFY OPTIMAL COMPUTE RESOURCES

Azure

Batch

CLOUD-SCALE JOB SCHEDULING AND COMPUTE MANAGEMENT

GCP

Compute Engine

VIRTUAL MACHINES RUNNING IN GOOGLE'S DATA CENTER.

GCP

Cloud Functions

EVENT-DRIVEN COMPUTE PLATFORM FOR CLOUD SERVICES AND APPS.

GCP

Migrate for Compute Engine

SERVER AND VM MIGRATION TO CLOUD ENGINE.

MC-META

Catalog

Compute

Storage

Statistics

etri

Logout

Compute

SEARCH FOR COMPUTE SERVICES OFFERED BY CLOUD SERVICE PROVIDERS

Filters

Select CSP

Select CSPs

Select regions

Select regions

Instance type

Instance type

Price range (\$)

min ~ max

Price Unit

CPU

min ~ max

RAM (GB)

min ~ max

DISK (GB)

min ~ max

GPU (Unit)

min ~ max

Reset

Search

SQL (data\_version:20231110)

#	CSP	REGION	LOCATION	CPU	RAM(GB)	DISK TYPE	DISK SIZE(GB)	GPU	GPU MEM(GB)	TENANCY	CURRENCY	PRICE	PRICE UNIT	INSTANCE TYPE
1	aws	aws:us-west-2	US West (Oregon)	64	512	EBS only	0	n/a	n/a	Dedicated	USD	12.899	1h	r5n.16xlarge
2	aws	aws:us-west-2	US West (Oregon)	4	16	2 x 14000 HDD	28000	n/a	n/a	Dedicated	USD	0.673	1h	d3en.xlarge
3	aws	aws:us-west-2	US West (Oregon)	4	8	EBS only	0	n/a	n/a	Shared	USD	0.422	1h	c5.xlarge
4	aws	aws:us-west-2	US West (Oregon)	2	4	1 x 118 SSD	118	n/a	n/a	Shared	USD	0.1608	1h	c6id.large
5	aws	aws:us-west-2	US West (Oregon)	32	64	EBS only	0	n/a	n/a	Shared	USD	1.553	1h	c7l.8xlarge
6	aws	aws:us-west-2	US West (Oregon)	2	15.25	1 x 32 SSD	32	n/a	n/a	Shared	USD	0.261	1h	r3.large



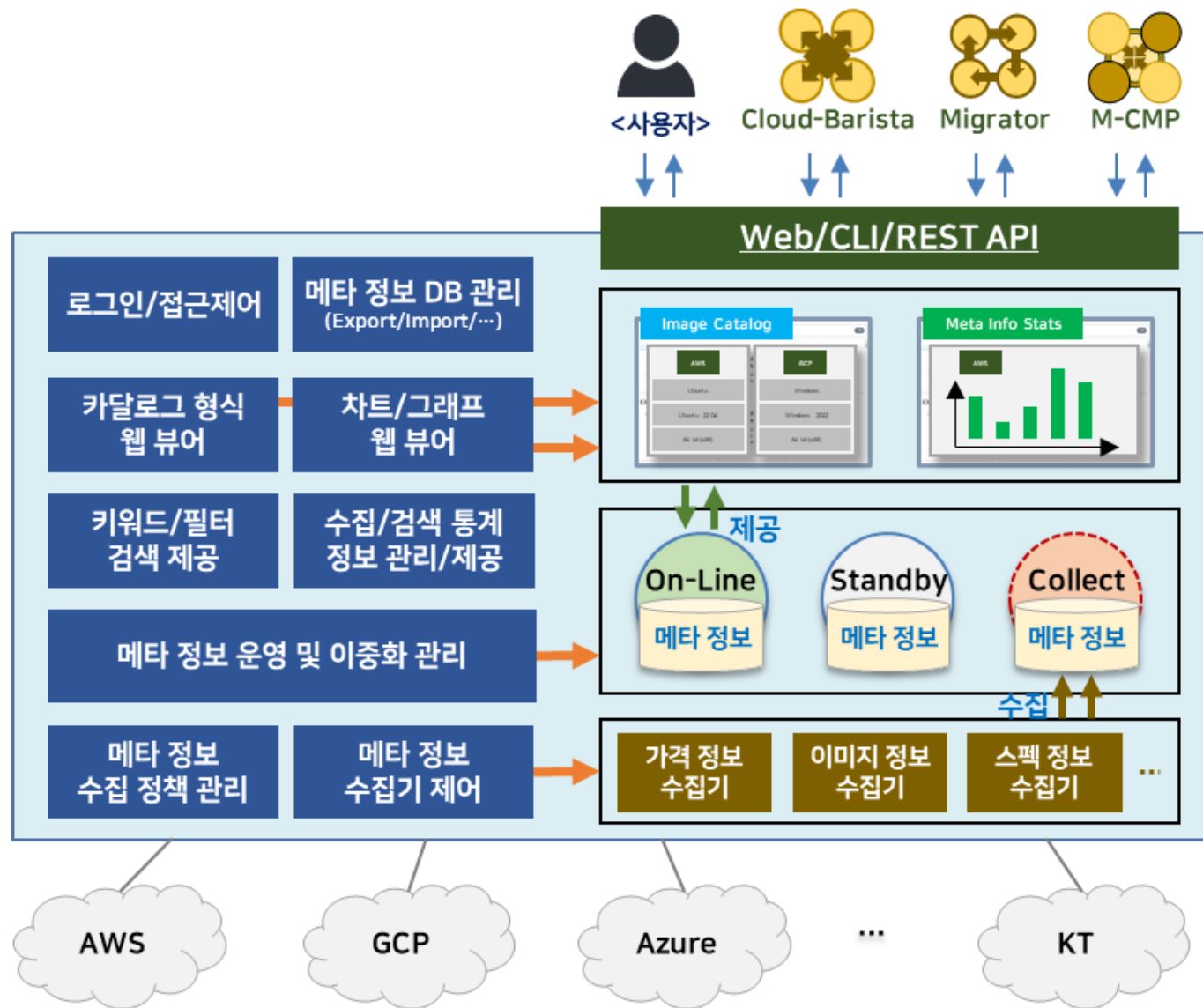


## 클라우드바리스타 커뮤니티 제9차 컨퍼런스

### MC-Meta 구조 & 기능

시나몬 (Cinnamon) 한잔 어떠세요 ?

# MC-Meta 구조



# MC-Meta 기능

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- 이종의 클라우드 메타 정보를 주기적으로 수집 및 통합하여 표준화된 형식으로 제공
  - 수집정보의 예) image 정보, spec 정보, 가격(price) 정보 등
- 멀티 클라우드 메타 정보에 대한 키워드 및 필터링 검색 기능 제공
- 클라우드 서비스 제공자별 메타 정보 수집기 제공
- (향후 수집 대상 확장을 위해) plug-in 방식의 확장 가능한 수집기 드라이버 구조 제공
- 수집 이력 통계 정보, 클라우드별 제공 서비스 변화, 변경 추이 등의 정보 제공
  - 예) image 개수 증가율, 신규 spec 정보 등
- 지원 인터페이스
  - GUI
  - CLI
  - RESTful API





## 클라우드바리스타 커뮤니티 제9차 컨퍼런스

# MC-Meta 데이터 통합 프로세스

시나몬 (Cinnamon) 한잔 어떠세요 ?



고마운 분



Ilyas F  
ilyas-it83

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Sr. Technical Program Manager

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Microsoft

Bangalore, India

it83.mohammed@gmail.com

bornoncloud.com

## Public Cloud Services Comparison

About

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Issue 34

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Sponsor

Category	Service	aws	Azure	Google Cloud	IBM Cloud	ORACLE <sup>®</sup> CLOUD	Alibaba Cloud	HUAWEI CLOUD
Compute	Shared Web hosting	AWS Amplify	Web Apps	Firebase	Web hosting services		Web Hosting Simple Application Server	
Compute	Virtual Server	Amazon EC2	Azure Virtual Machine	Compute Engine	Classic Virtual Server Virtual Server for VPC (x86 & s390x) Power Systems Virtual Servers Hyper Protect Virtual Server (LinuxONE) Quantum Services	Oracle Cloud Infrastructure Compute,	Alibaba ECS	Huawei Cloud Elastic Cloud Server
Compute	Bare Metal Server	Amazon EC2 Bare Metal Instance	Azure Bare Metal Servers (Large Instance Only for SAP Hana)	Bare Metal Solution	Bare Metal Servers	Oracle Bare Metal Servers	ECS Bare Metal Instance	Huawei Cloud Bare Metal Server
Compute	VMware	VMC on AWS	Azure VMware Solution	Google Cloud VMware Engine	VMware Solutions Shared VMware Solutions Dedicated VMware Regulated Workloads VMware Solutions Dedicated - Security & Compliance Readiness Bundle	Oracle Cloud VMWare Solution		
Compute	Virtual Dedicated Host	Amazon EC2 Dedicated Hosts AWS Nitro Enclaves High Performance	Azure Dedicated Host	Sole Tenant Node (Beta)	Dedicated Virtual Servers Infrastructure (VSI) Dedicated host for VPC	Dedicated Virtual Machine Hosts	Dedicated Host	Huawei Cloud Dedicate Host

<https://github.com/ilyas-it83/CloudComparer>



# 클라우드 서비스 카테고리 통합

## NCP(ncloud), NHN Cloud, KT Cloud, Tencent 등의 클라우드 서비스 분석 내용 추가

Category	Service	AWS	Azure	GCP	Alibaba	ncloud	nhncloud	tencent	IBM	Oracle	Huawei	
Compute	Shared Web hosting	<a href="#">AWS Amplify</a>	<a href="#">Web Apps</a>	<a href="#">Firebase</a>	Web Hosting Simple Application Server				<a href="#">Web hosting services</a>			
Compute	Virtual Server	<a href="#">Amazon EC2</a>	<a href="#">Azure Virtual Ma</a>	<a href="#">Compute Engine</a>	<a href="#">Alibaba ECS</a>	<a href="#">ncloud server</a>	<a href="#">nhncloud compute</a>	<a href="#">cloud virtual ma</a>	Classic Virtual S Virtual Server fo Power Systems Vi Hyper Protect Vi Quantum Services	<a href="#">Oracle Cloud Infr</a>	<a href="#">Huawei Cloud Elastic Cloud Server</a>	
Compute	Bare Metal Server	<a href="#">Amazon EC2 Bare</a>	<a href="#">Azure Bare Metal</a>	<a href="#">Bare Metal Solut</a>	<a href="#">ECS Bare Metal Instance</a>				<a href="#">Bare Metal Server</a>	<a href="#">Oracle Bare Meta</a>	<a href="#">Huawei Cloud Bare Metal Server</a>	
Compute	VMware	<a href="#">VMC on AWS</a>	<a href="#">Azure VMware Sol</a>	<a href="#">Google Cloud VMware Engine</a>					VMware Solutions VMware Solutions VMware Regulated VMware Solutions	<a href="#">Oracle Cloud VMWare Solution</a>		
Compute	Virtual Dedicated Host	Amazon EC2 Dedic AWS Nitro Enclav	<a href="#">Azure Dedicated</a>	<a href="#">Sole Tenant Node</a>	<a href="#">Dedicated Host</a>				Dedicated Virtual Dedicated host fo	<a href="#">Dedicated Virtual</a>	<a href="#">Huawei Cloud Dedicate Host</a>	
Compute	High Performance Computing	High Performance AWS ParallelClus Elastic Fabric / NICE DCV	<a href="#">Azure High Perfor</a>	<a href="#">High performance computing</a>					IBM Spectrum LSF IBM Spectrum Sym	<a href="#">Oracle Dedicated Virtual Machine Hosts</a>		
Compute	Container Registration Serv	<a href="#">Amazon Elastic C</a>	<a href="#">Azure Container</a>	<a href="#">Artifact Registry</a>	<a href="#">Container Registry</a>				<a href="#">IBM Cloud Contain</a>	<a href="#">Oracle Cloud Infr</a>	<a href="#">Software Repository for Container</a>	
Compute	Container Management Service	Amazon Elastic C Amazon Elastic C Red Hat Openshift Bottlerocket	Azure Kubernetes Azure Container Azure Red Hat Op Bottlerocket	<a href="#">Kubernetes Engine</a>	Container Service Container Service for Kubernetes				IBM Cloud Kuberne Redhat Openshift IBM Cloud Code E	<a href="#">Container Engine</a>	Cloud Container Instance Cloud Container Engine	
Compute	Serverless compute for cont	AWS Fargate AWS Proton	Azure Container Azure Container	<a href="#">Google Cloud Run</a>					<a href="#">IBM Cloud Code Engine</a>			
Compute	Serverless container platfor	<a href="#">AWS App Runner</a>	<a href="#">Azure Container</a>	<a href="#">Google Cloud Run</a>					<a href="#">IBM Cloud Code E</a>	<a href="#">Oracle Functions</a>		
Compute	Micro Services App Developm	<a href="#">AWS Lambda</a>	Azure Service Fal Azure Functions Event Grid	Google Cloud Fun EventArc	<a href="#">Function Compute</a>				IBM Cloud Code E IBM Cloud Functi	<a href="#">Oracle Functions</a>	<a href="#">FunctionGraph</a>	
Compute	Serverless app repository	<a href="#">AWS Serverless Application Repository</a>										
Compute	Virtual Private Servers	<a href="#">Amazon Lightsail</a>	<a href="#">Azure App Service Environment</a>		<a href="#">Simple Application Server</a>				Classic Virtual Server Virtual Server for VPC		<a href="#">Hyper Elastic Cloud Server</a>	

# 클라우드 서비스 메타정보 스키마 통합

## compute

csp	region	location	cpu_cnt	cpu_mem	disk_type	disk_size	gpu_cnt	gpu_mem	tenancy	currency	price	price_unit	instance_type
aws	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
azure	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓	✓	✓	✓
gcp	✓	✗	✓	✓	✗	✗	✗	✗	✗	✓	✓	✓	✓
alibaba	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓

✓	확실
✗	불확실

## storage

csp	region	name	size	max_size	io	io_max	bandwidth	bandwidth_max	price
aws	✓	✓	✓	✓	✓	✓	✓	✓	✓
azure	✗	✗	✗	✗	✗	✗	✗	✗	✗
gcp	✗	✗	✗	✗	✗	✗	✗	✗	✗
alibaba	✗	✗	✗	✗	✗	✗	✗	✗	✗

✓	확실
✗	불확실

## image

csp	region	id	name	platform	description
aws	✓	✓	✓	✓	✓
azure	✓	✓	✓	✓	✓
gcp	✓	✓	✓	✓	✓
alibaba	✓	✓	✓	✓	✓

✓	확실
✗	불확실





# 데이터 수집 & 통합 프로세스

## FileSystem

## DB

```
✓ data
  > catalog
  ✓ compute
    > 20231104
    > 20231105
    ✓ 20231106
      alibaba.csv
      analyzer_done.txt
      aws.csv
      azure.csv
      gcp.csv
      loader_done.txt
```

### 데이터 테이블

- catalog\_yyyymmdd (\*)
- compute\_yyyymmdd (\*)
- storage\_yyyymmdd (\*)
- image\_yyyymmdd (\*)

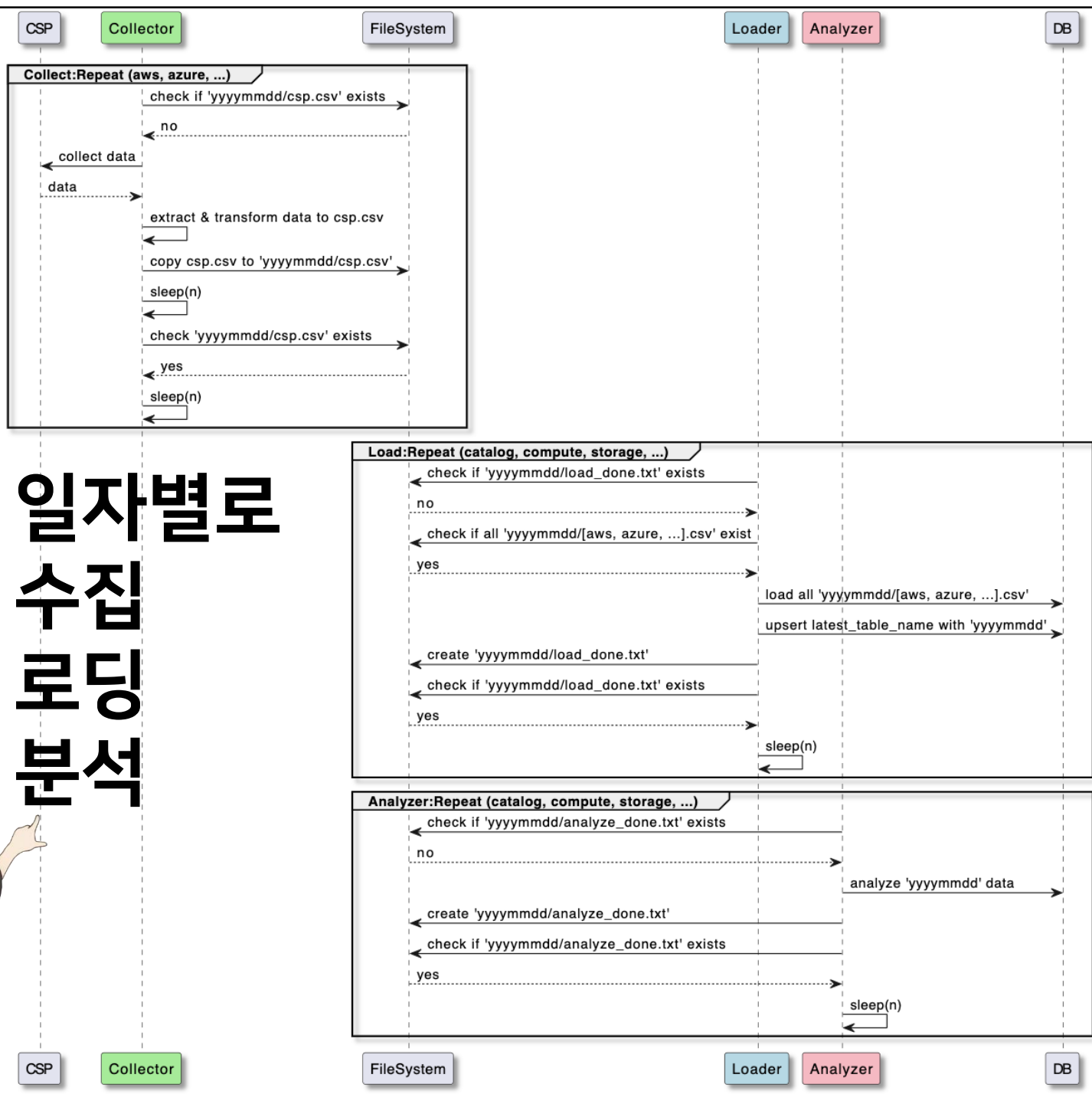
### 통계 테이블

- catalog (1)
- compute (1)
- storage (1)
- image (1)

### 최신 테이블 이름 정보 테이블

- latest\_table (1)

## 일자별로 수집로딩 분석



# 데이터 수집 & 통합 프로세스 / 데이터 변환

## 예) aws compute price 데이터

```
{ } af-south-1-los-1.json
{ } af-south-1.json
{ } ap-east-1.json
{ } ap-northeast-1-t
{ } ap-northeast-1-v
{ } ap-northeast-1-v
{ } ap-northeast-1.js
{ } ap-northeast-2-1
{ } ap-northeast-2-1
{ } ap-northeast-2.j
{ } ap-northeast-3.j
{ } ap-south-1-ccu-
{ } ap-south-1-del-
{ } ap-south-1.json
{ } ap-south-2.json
{ } ap-southeast-1-i
{ } ap-southeast-1-i
{ } ap-southeast-1.j
{ } ap-southeast-2-
{ } ap-southeast-2-
{ } ap-southeast-2-
{ } ap-southeast-2.j
{ } ap-southeast-3.j
{ } ap-southeast-4.i

"QASUSCQ3W6YKHV7H" : {
  "sku" : "QASUSCQ3W6YKHV7H",
  "productFamily" : "Compute Instance",
  "attributes" : {
    "servicecode" : "AmazonEC2",
    "location" : "Asia Pacific (Hong Kong)",
    "locationType" : "AWS Region",
    "instanceType" : "m5d.large",
    "currentGeneration" : "Yes",
    "instanceFamily" : "General purpose",
    "vcpu" : "2",
    "physicalProcessor" : "Intel Xeon Platinum 8175",
    "clockSpeed" : "3.1 GHz",
    "memory" : "8 GiB",
    "storage" : "1 x 75 NVMe SSD",
    "networkPerformance" : "Up to 10 Gigabit",
    "processorArchitecture" : "64-bit",
    "tenancy" : "Host",
    "operatingSystem" : "Linux",
    "licenseModel" : "No License required",
    "usagetype" : "APE1-HostBoxUsage:m5d.large",
    "operation" : "RunInstances",
    "availabilityzone" : "NA",
    "capacitystatus" : "Used",
    "classicnetworkingsupport" : "false",
    "dedicatedEbsThroughput" : "Up to 2120 Mbps",
    "ecu" : "10",
    "enhancedNetworkingSupported" : "Yes",
    "gpuMemory" : "NA",
    "intelAvxAvailable" : "Yes",
    "intelAvx2Available" : "Yes",
    "intelTurboAvailable" : "Yes",
    "marketoption" : "OnDemand",
    "normalizationSizeFactor" : "4",
    "preInstalledSw" : "NA",
    "processorFeatures" : "Intel AVX; Intel AVX2; Intel AVX512; Intel Turbo",
    "regionCode" : "ap-east-1",
```

데이터  
파싱  
추출  
변환

## 예) aws compute price 데이터변환 코드의 예

```
# Match pattern like "2 x 1000 HDD"
match = re.match(r'(\d+) x (\d+) (\w+ \w+|\w+)', s)
if match:
    count, size, stype = match.groups()
    # Convert "NVMe SSD" to "SSD"
    if stype == "NVMe SSD":
        stype = "SSD"

    # GB NVMe
    # GB SSD
    if stype == "GB NVMe" or stype == "GB SSD":
        stype = "SSD"

    return (int(count) * int(size), stype)

# Match pattern like "2400 GB NVMe SSD"
match_gb = re.match(r'(\d+) GB (\w+ \w+|\w+)', s)
if match_gb:
    size, stype = match_gb.groups()
    # Convert "NVMe SSD" to "SSD"
    if stype == "NVMe SSD":
        stype = "SSD"
    return (int(size), stype)
```

## 예) 수집 결과 데이터 (CSV)

```
aws,aws:us-west-2,US West (Oregon),64,512.0,EBS only,0,None,None,Dedicated,USD,12.899,1h,r5n.16xlarge,None
aws,aws:us-west-2,US West (Oregon),4,16.0,2 x 14000 HDD,28000,None,None,Dedicated,USD,0.673,1h,d3en.xlarge,None
aws,aws:us-west-2,US West (Oregon),4,8.0,EBS only,0,None,None,Shared,USD,0.422,1h,c5.xlarge,None
aws,aws:us-west-2,US West (Oregon),2,4.0,1 x 118 SSD,118,None,None,Shared,USD,0.1608,1h,c6id.large,None
aws,aws:us-west-2,US West (Oregon),32,64.0,EBS only,0,None,None,Shared,USD,1.553,1h,c7i
aws,aws:us-west-2,US West (Oregon),2,15.25,1 x 32 SSD,32,None,None,Shared,USD,0.261,1h,
aws,aws:us-west-2,US West (Oregon),96,384.0,EBS only,0,None,None,Shared,USD,18.33304,1h
aws,aws:us-west-2,US West (Oregon),16,64.0,EBS only,0,None,None,Dedicated,USD,7.96122,1
aws,aws:us-west-2,US West (Oregon),2,16.0,1 x 118 SSD,118,None,None,Shared,USD,0.6312,1
aws,aws:us-west-2,US West (Oregon),1,3.75,1 x 410 SSD,410,None,None,Shared,USD,0.744,1h
aws,aws:us-west-2,US West (Oregon),32,256.0,EBS only,0,None,None,Dedicated,USD,6.90821,
aws,aws:us-west-2,US West (Oregon),2,7.5,1 x 32 SSD,32,None,None,Dedicated,USD,0.447,1h
aws,aws:us-west-2,US West (Oregon),128,512.0,EBS only,0,None,None,Dedicated,USD,16.2119
aws,aws:us-west-2,US West (Oregon),48,96.0,EBS only,0,None,None,Dedicated,USD,20.1846,1
aws,aws:us-west-2,US West (Oregon),8,16.0,1 x 474 SSD,474,None,None,Shared,USD,0.5282,1
```

```
gcp,gcp:asia-northeast2,asia-northeast2,1,4,,,,USD,0.04298,1h,E2-M
gcp,gcp:asia-northeast3,asia-northeast3,1,4,,,,USD,0.04298,1h,E2-M
gcp,gcp:asia-south1,asia-south1,1,4,,,,USD,0.04024,1h,E2-MEDIUM,
gcp,gcp:asia-south2,asia-south2,1,4,,,,USD,0.04024,1h,E2-MEDIUM,
gcp,gcp:asia-southeast,asia-southeast,1,4,,,,USD,0.04133,1h,E2-ME
gcp,gcp:asia-southeast1,asia-southeast1,1,4,,,,USD,0.04133,1h,E2-M
gcp,gcp:asia-southeast2,asia-southeast2,1,4,,,,USD,0.0450497,1h,E2
gcp,gcp:australia,australia,1,4,,,,USD,0.04754,1h,E2-MEDIUM,
gcp,gcp:australia-southeast1,australia-southeast1,1,4,,,,USD,0.047
gcp,gcp:australia-southeast2,australia-southeast2,1,4,,,,USD,0.047
gcp,gcp:europa,europa,1,4,,,,USD,0.03686,1h,E2-MEDIUM,
gcp,gcp:europa-central2,europa-central2,1,4,,,,USD,0.04317,1h,E2-M
gcp,gcp:europa-north1,europa-north1,1,4,,,,USD,0.03689,1h,E2-MEDI
gcp,gcp:europa-west1,europa-west1,1,4,,,,USD,0.03686,1h,E2-MEDIUM,
```

```
alibaba,alibaba:cn-qingdao,China (Qingdao),2,2.0,,17,0,0,dedicated,USD,0.071,,ecs.s2.small,
alibaba,alibaba:cn-qingdao,China (Qingdao),4,4.0,,17,0,0,dedicated,USD,0.147,,ecs.s3.medium,
alibaba,alibaba:cn-qingdao,China (Qingdao),8,8.0,,17,0,0,dedicated,USD,0.294,,ecs.c1.small,
alibaba,alibaba:cn-qingdao,China (Qingdao),16,16.0,,17,0,0,dedicated,USD,0.587,,ecs.c2.medium,
alibaba,alibaba:cn-qingdao,China (Qingdao),1,2.0,,17,0,0,dedicated,USD,0.039,,ecs.s1.small,
alibaba,alibaba:cn-qingdao,China (Qingdao),2,4.0,,17,0,0,dedicated,USD,0.097,,ecs.s2.large,
alibaba,alibaba:cn-qingdao,China (Qingdao),4,8.0,,17,0,0,dedicated,USD,0.196,,ecs.s3.large,
alibaba,alibaba:cn-qingdao,China (Qingdao),8,16.0,,17,0,0,dedicated,USD,0.397,,ecs.c1.large,
alibaba,alibaba:cn-qingdao,China (Qingdao),16,32.0,,17,0,0,dedicated,USD,0.798,,ecs.c2.large,
alibaba,alibaba:cn-qingdao,China (Qingdao),1,4.0,,17,0,0,dedicated,USD,0.072,,ecs.s1.medium,
```

```
azure,azure:japanwest,JA West,32,256.0,,1047,0,0.0,,USD,4.147,1h,Standard_E32-8s_v4,
azure,azure:japanwest,JA West,32,256.0,,1047,0,0.0,,USD,2.675,1h,Standard_E32-8s_v4,
azure,azure:eastasia,AP East,4,32.0,,1047,0,0.0,,USD,0.033932,1h,Standard_E4_v5,
azure,azure:eastasia,AP East,4,32.0,,1047,0,0.0,,USD,0.067931,1h,Standard_E4_v5,
azure,azure:jioindiacentral,IN Central Jio,2,16.0,,1047,0,0.0,,USD,0.026,1h,Standard_E2as_v4,
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## Metabase Open Source Edition

### GNU Affero General Public License (AGPL)

The Metabase Open Source Edition is offered under the AGPL.

If you want to use the code, you must abide by the AGPL.

If you want to embed iframes in your application, you can do it in one of the following ways:

- Abide by the AGPL.
- Abide by the [Embedding License](#), which includes leaving the “Powered by Metabase” logo on embedded artifacts (like dashboards and questions).
- Purchase a [Metabase Commercial Software License](#).

Though Metabase Enterprise Edition is [source available](#), without the commercial license, you can't use any of the Enterprise features, like [interactive embedding](#), [data sandboxing](#), [auditing](#), or SSO with [SAML](#) or [JWT](#). For a list of premium features, see our [pricing page](#).

### Statistics

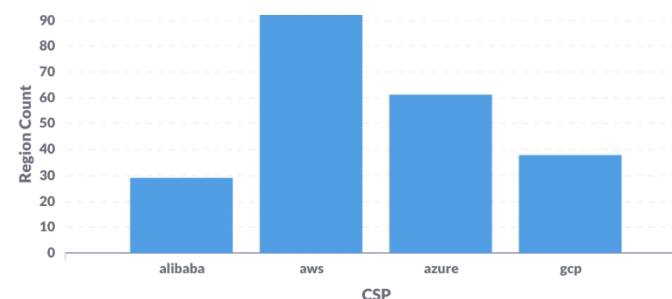
STATISTICS OF CLOUD SERVICE PROVIDERS

#### MC-Meta 분석 대시보드

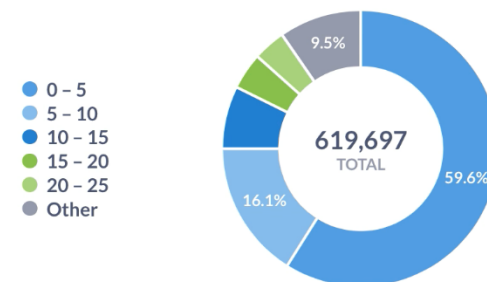
[CSP 기본 현황 분석](#)

[타임시리즈 분석](#)

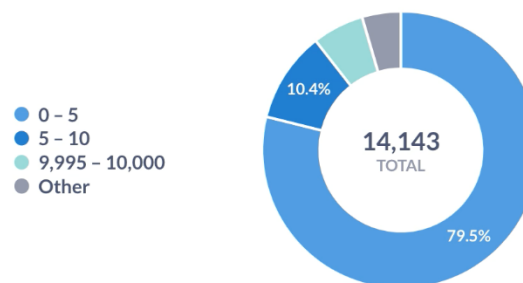
Region Count / CSP



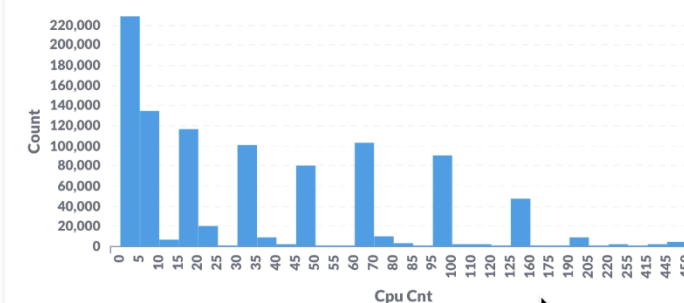
Price Count / AWS



Price Count / Alibaba



CPU Count Histogram





## 클라우드바리스타 커뮤니티 제9차 컨퍼런스

### MC-Meta 시연

시나몬 (Cinnamon) 한잔 어떠세요 ?

# MC-Meta 향후 계획

- 통합 CSP
  - 현재: AWS, Azure, GCP, Alibaba
  - 미래: 보다 많은 CSP 통합 예정
- 통합 메타정보
  - 현재: 카탈로그, Compute, Storage, Image(30%), 통계정보
  - 이슈: 통합 메타정보를 위한 스키마 추상화에 **막대한 공수 필요**, **개발자원부족**
- MC-Meta 향후 개발 계획
  - 목표 변경
    - 범용 메타정보 제공에서 클라우드바리스타 중심의 메타정보 제공
    - 통합범위 축소
    - 통합비용 감소
  - CB-Spider API 활용한 추상화된 메타 정보 수집
  - 수집/검색/동기화/통계 및 설정 관리 등 본연의 기능 개발/안정화에 집중



CB-Spider



멀티 클라우드에 진심인 사람들의 이야기

멀티/분산 클라우드, 차세대 클라우드를 향한 도전과 기회

Cloud-Barista Community the 9<sup>th</sup> Conference

감사합니다.