議程場次	講師
MySQL HeatWave Update	杜修文 -MySQL Solution Engineering Manager
MySQL Customer Reference	
Move and Improve your MySQL App in OCI	Nelson Mak –OCI Solutions Director, JAPAC

甲骨文MySQL雲服務
MySQL Database Service 和 HeatWave

唯一用MySQL企業版且整合高性能查詢加速引擎-HeatWave的MySQL雲服務

只有在
Oracle Cloud Infrastructure獨家提供

杜修文
Solution Engineer Manager
MySQL Global Business Unit
Oracle LLC

Statements Safe Harbor

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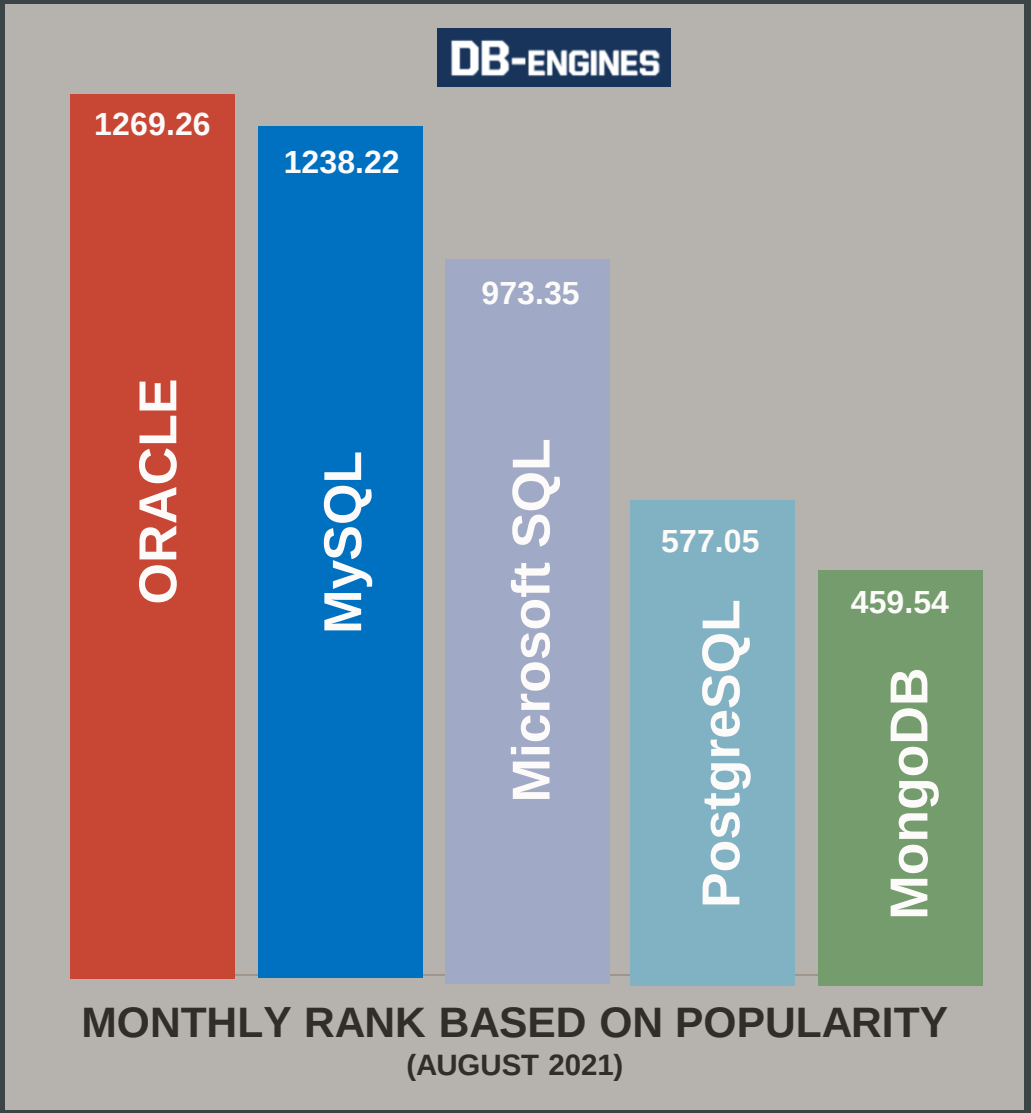
MySQL是排名第一的開源資料庫

DB Engine的評價:

非常快,可靠,且有彈性的資料庫

定期發行更新版,帶出新功能和能力

支援多種最受歡迎的語言MySQL開發者的社群非常活躍



開發者喜歡MySQL

JetBrains 所做的調查

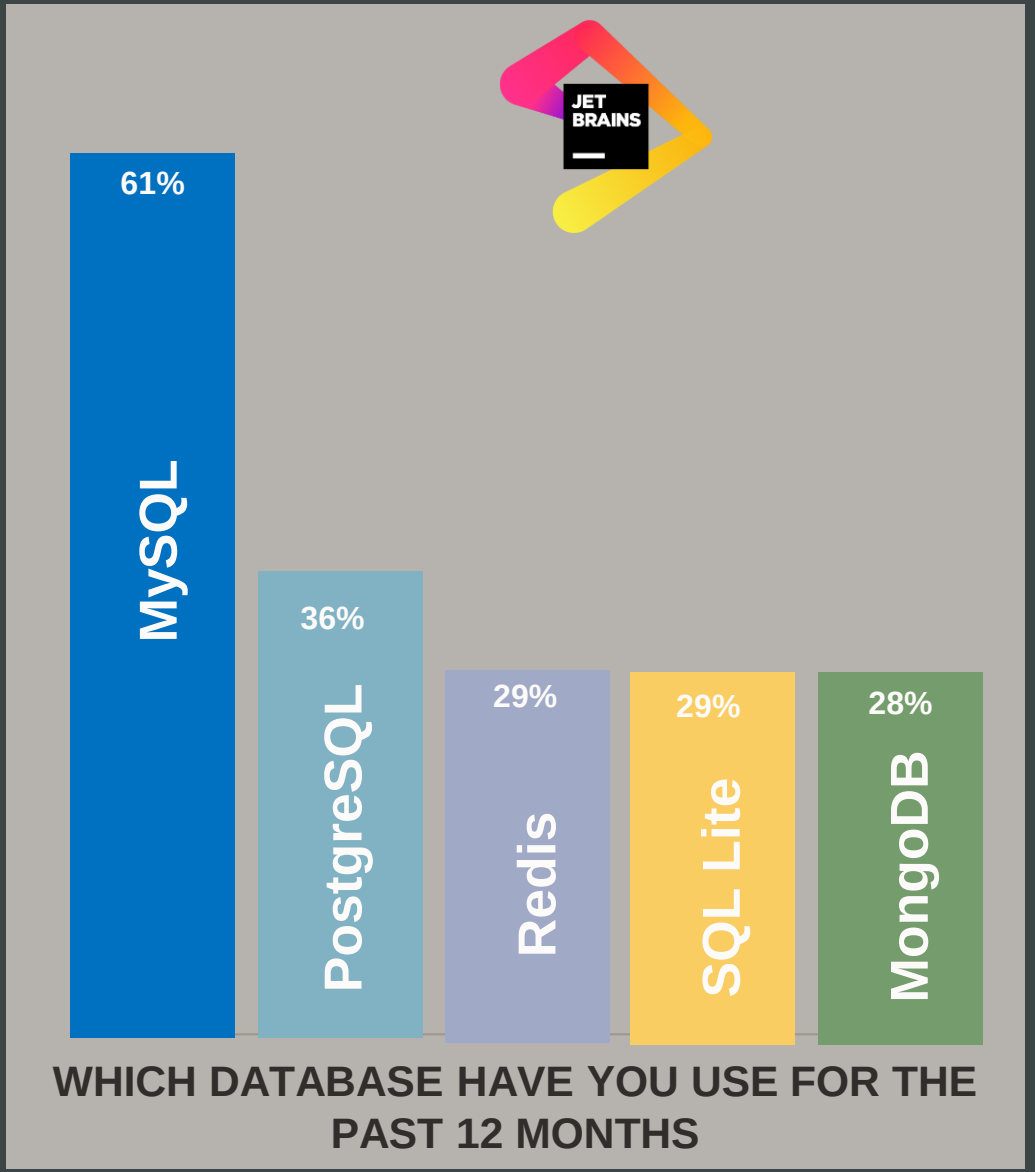
使用最廣的資料庫

過去12個月裡許多應用系統開發者仰仗MySQL其開發應用系統

用SQL為主時,MySQL是首選資料庫

因為以下原因而選擇

- Performance
- Scalability
- Robustness
- Cost



MySQL企業版先進的安全功能

Authentication

很容易的整合到安全架構中,包括PAM和Windows Active Directory

Masking

內建解決方安,在顯示敏感的資料時隱藏和替換它們的值

Encryption

在傳輸和存資料時,以即時的方式自動加密,具有加密,密鑰生成,數位簽證和其他密碼功能.

Firewall

監看資料庫線程,自動產生允許執行之SQL的自名單,且攔阻沒被允許的資料庫取用.

Audit

讓使用者能利用活動日誌,實施基於活動的日誌政策,管理稽核日誌檔案,且和Oracle Audit Vault或其他稽核工系統整合.

Backup

提供資料庫"熱"備份,支援完全,增量,和部份備份,以及指時恢復,以降低資料丟失的風險.

Monitor

超過四十個監看圖,和三百條最佳施行原則動態建議;主動告警資料庫的異常(或有可能異常的趨勢);查詢分析器替您找出需要優化的SQL,並分析其狀況和執行計劃

TDE

保護表空間資料檔案甚至整個資料目錄,不會在不合法的地方被讀出

1. 不需額外的硬體/VM
2. 不需額外的軟體
3. 不需額外的授權

MySQL企業版協助客戶滿足安全法規

PCI Security Standards Council™

HIPAA
Health Insurance Portability and Accountability Act

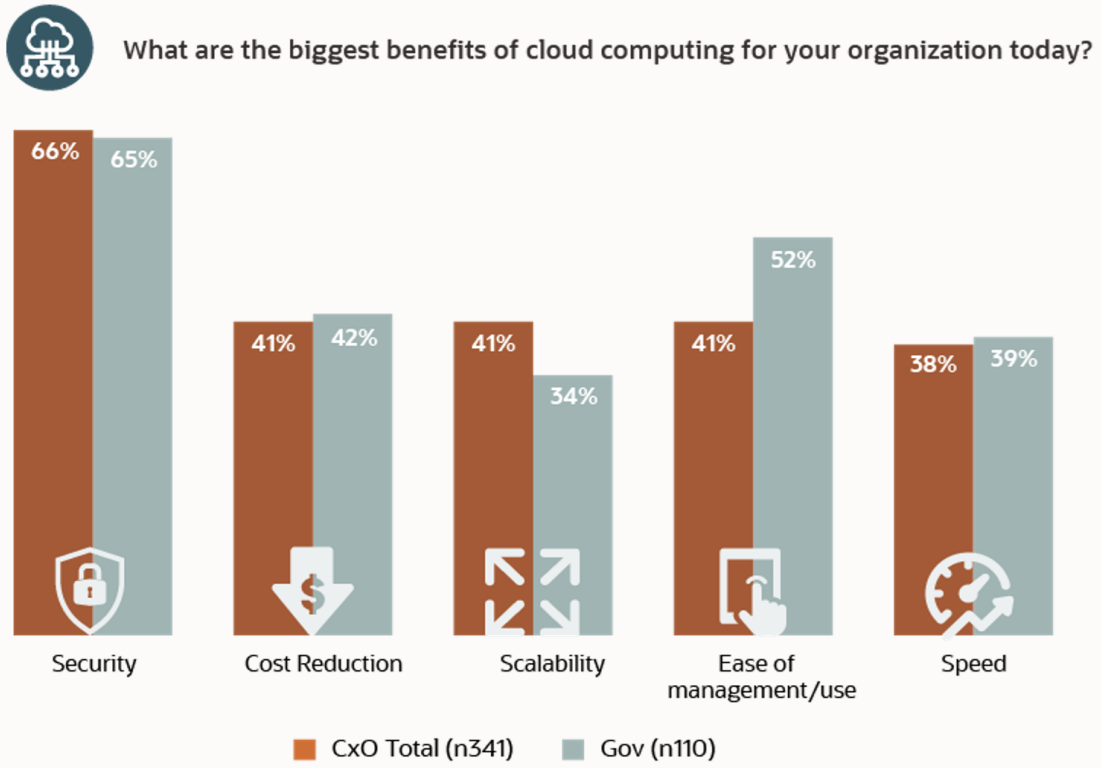
Sarbanes-Oxley
Financial and Accounting Disclosure Information

GDPR

Data Protection Act 1998

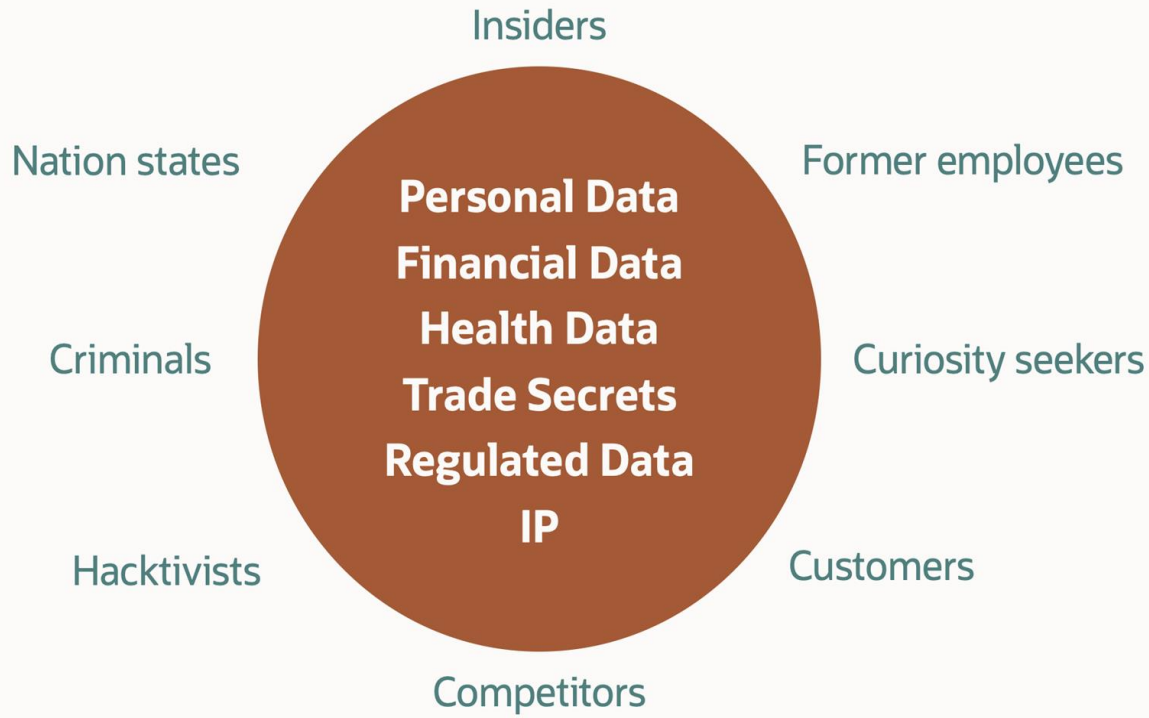
CIS Benchmarks™

資料庫持續往雲上遷移



Source: CxO survey

Increasingly difficult to keep data secure on premise



客戶為何選擇MySQL Database Service

安全
使用 MySQL 企業版來滿足安全合規性

快速開通和自動化
為雲設計並在 OCI 中進行優化

外包
由 Oracle 提供的 MySQL 核心資料庫管理和基礎設施管理

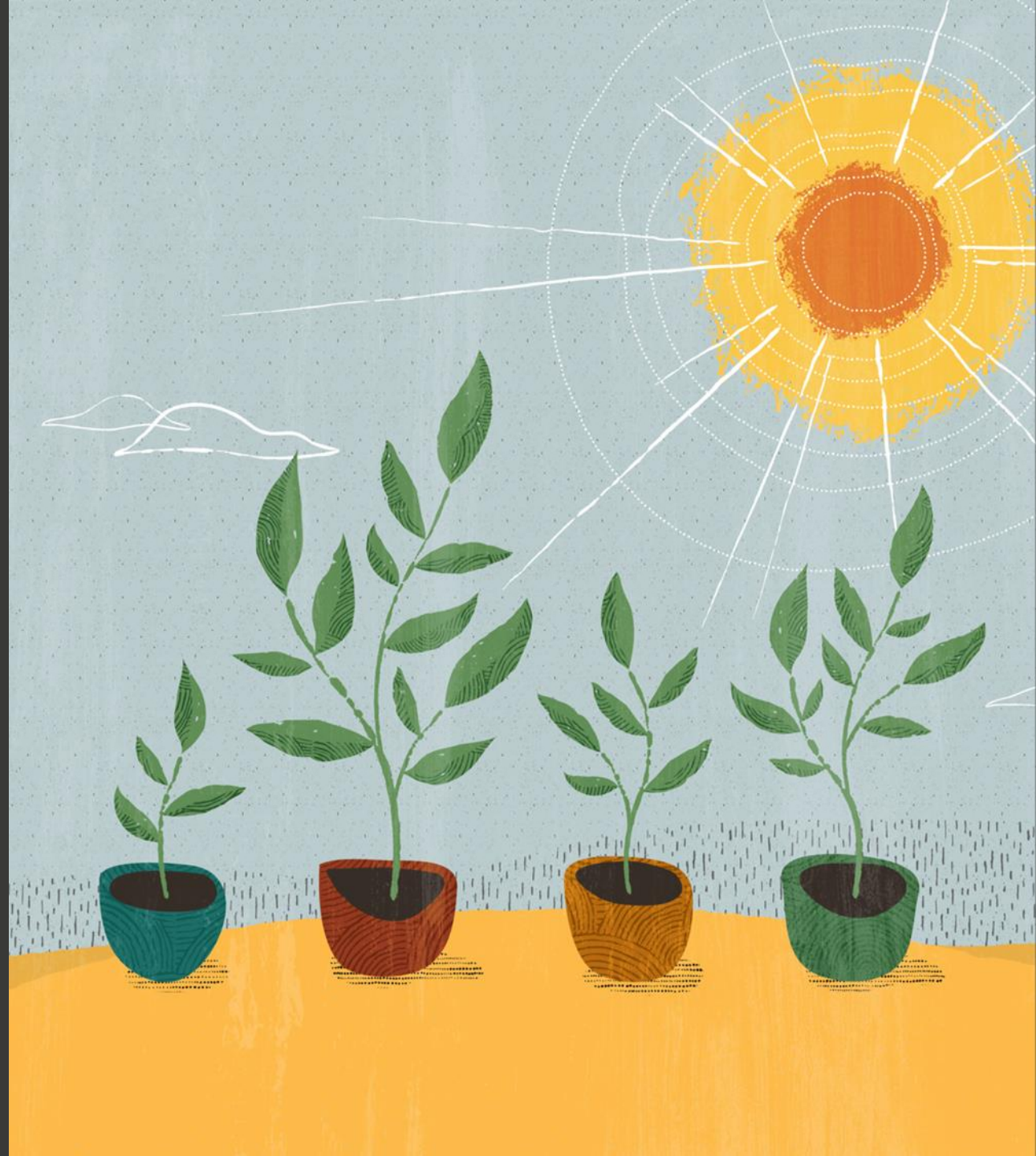
更省錢
遠比其他第三方雲便宜

什麼是 MySQL Database Service (MDS)？

Oracle所提供的MySQL雲服務,只在

Oracle Cloud Infrastructure

獨家提供



MySQL Database Service 是對第二代 Oracle Cloud Infrastructure 優化

有關第二代OCI: 保持第一代雲的優點,同時持續改進

First Generation Cloud

- Elastic resources
- Pay for what you use
- High scale
- Self-service
- Easy to use

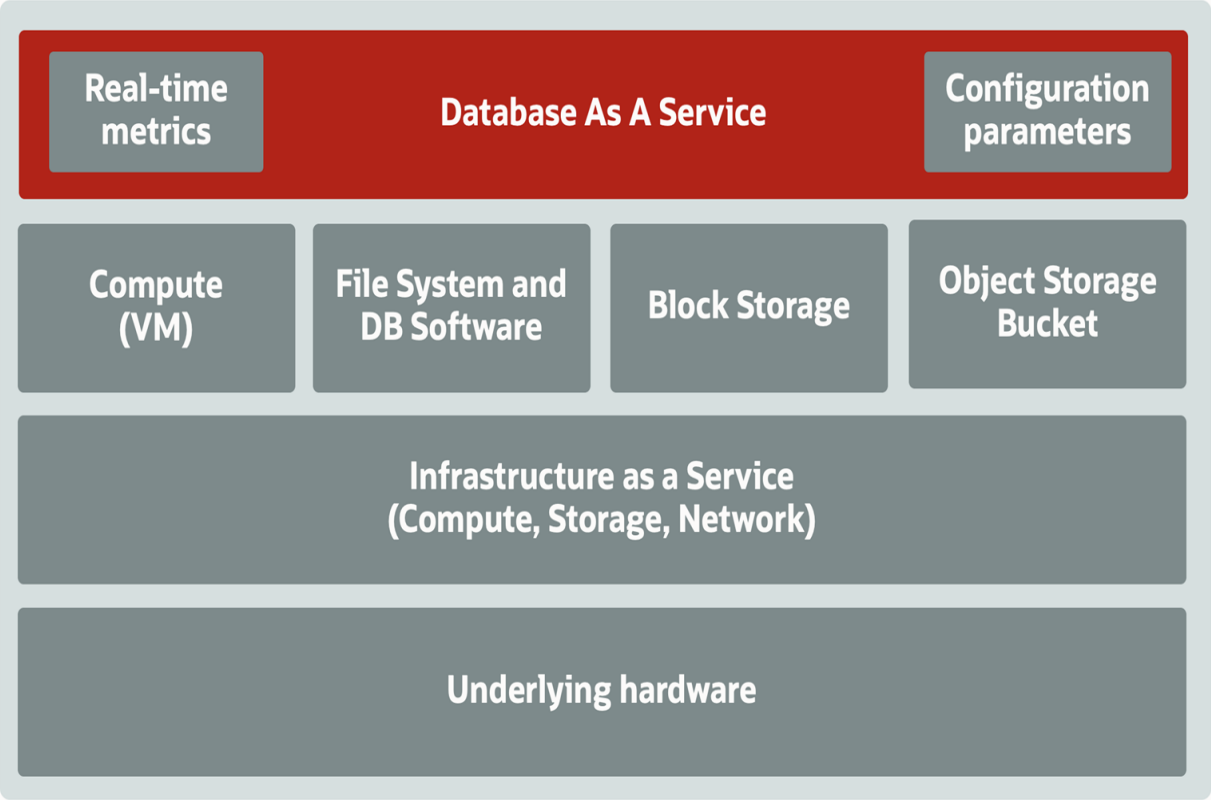
Oracle Gen 2 Cloud

- Security First
- Superior Performance
- Superior Economics
- Enterprise Expertise
- Open Ecosystem

MySQL Database Service (MDS)
使用 MySQL企業版

1. 降低資料洩漏的風險
2. 滿足法令的要求
3. 取得最新的更新版
4. 和地端的MySQL 100% 相容
5. 得到專家級MySQL 技術支援

MySQL Database Service (MDS) 快速開通



MySQL Database Service (MDS) 的底層用OCI的資源, 自動管理運算,存儲,和按需求開通網路,特別是不需人工介入.

1. 不需要資料中心設施
2. 不需要機房,硬體
3. 不需要管理資料中心和太高深的 MySQL 專業知識
4. 具可擴展性和擴展能力
5. 減少時間和資源

MySQL Database Service (MDS) 是自動化的

第二代人OCI 提供敏捷性、可擴展性、部署速度和容易管理的能力

1. 資料庫可擴展性
2. 資料庫易於管理
3. 部署速度

● Automated
● Manual

		MySQL On Premise	MySQL Database Service
Database	Scaling	●	●
	Backup	●	●
	Security Patch & Upgrade	●	●
	Provision & Configure	●	●
OS	OS Security Patch & Upgrade	●	●
	OS Installation	●	●
Server	Hardware Purchase & Maintenance	●	●
Storage	Storage Purchase & Maintenance	●	●
Data Center	Rack & Space	●	●
	Power, HVAC, Networking	●	●

以MySQL Database Service 外包 MySQL Database的運作

1 Oracle 負責

- 備份和恢復
- 具有自動故障轉移的高可用性
- 垂直和水平擴展
- 資料庫和作業系統修補
- 監控和日誌處理
- MySQL 企業版提供先進的安全性選項

2 客戶負責

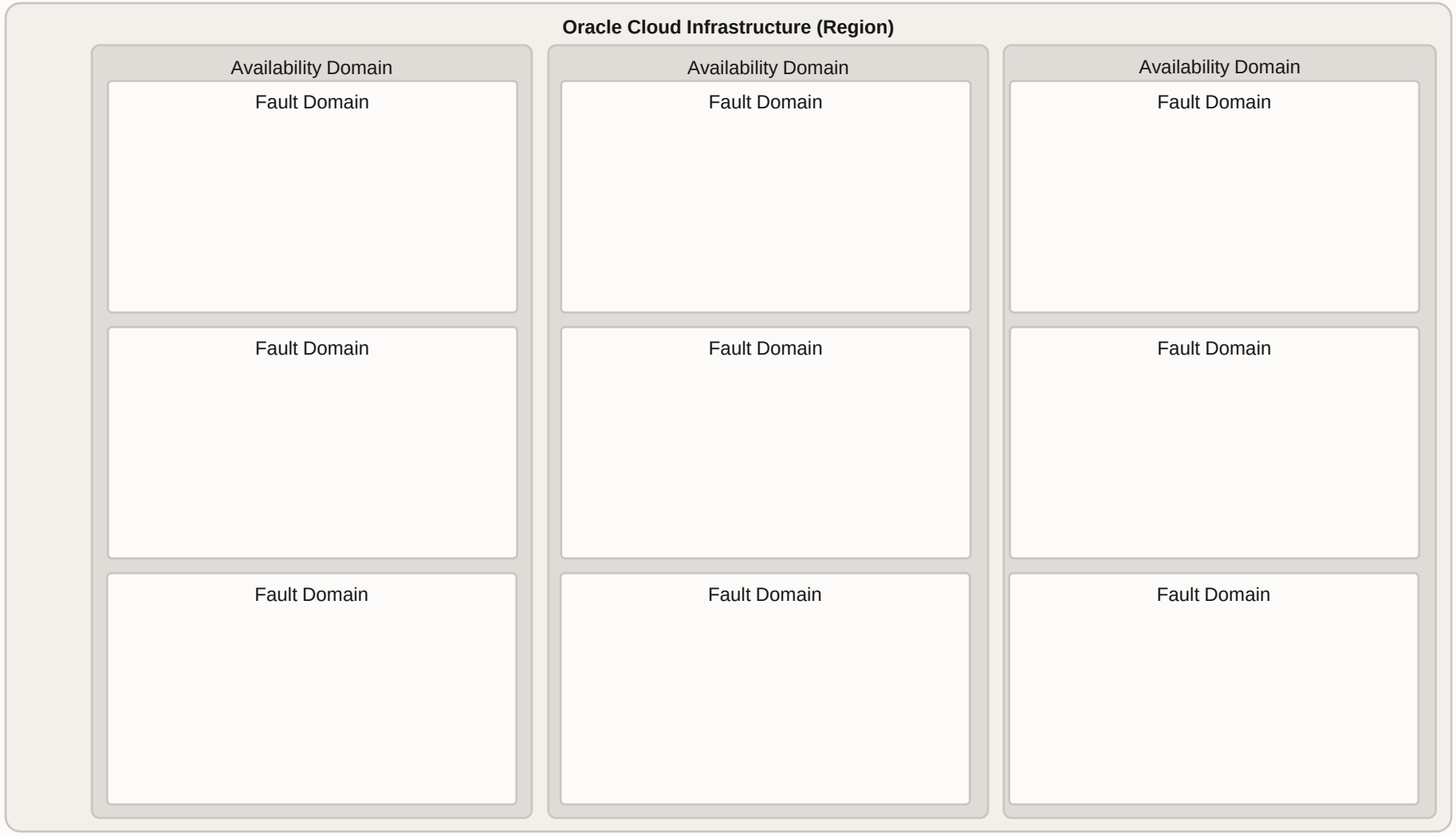
- 邏輯模式建模
- 查詢設計和優化
- 定義資料使用和保留策略

選擇您的地區

全球 23 個地區、31 個可用域

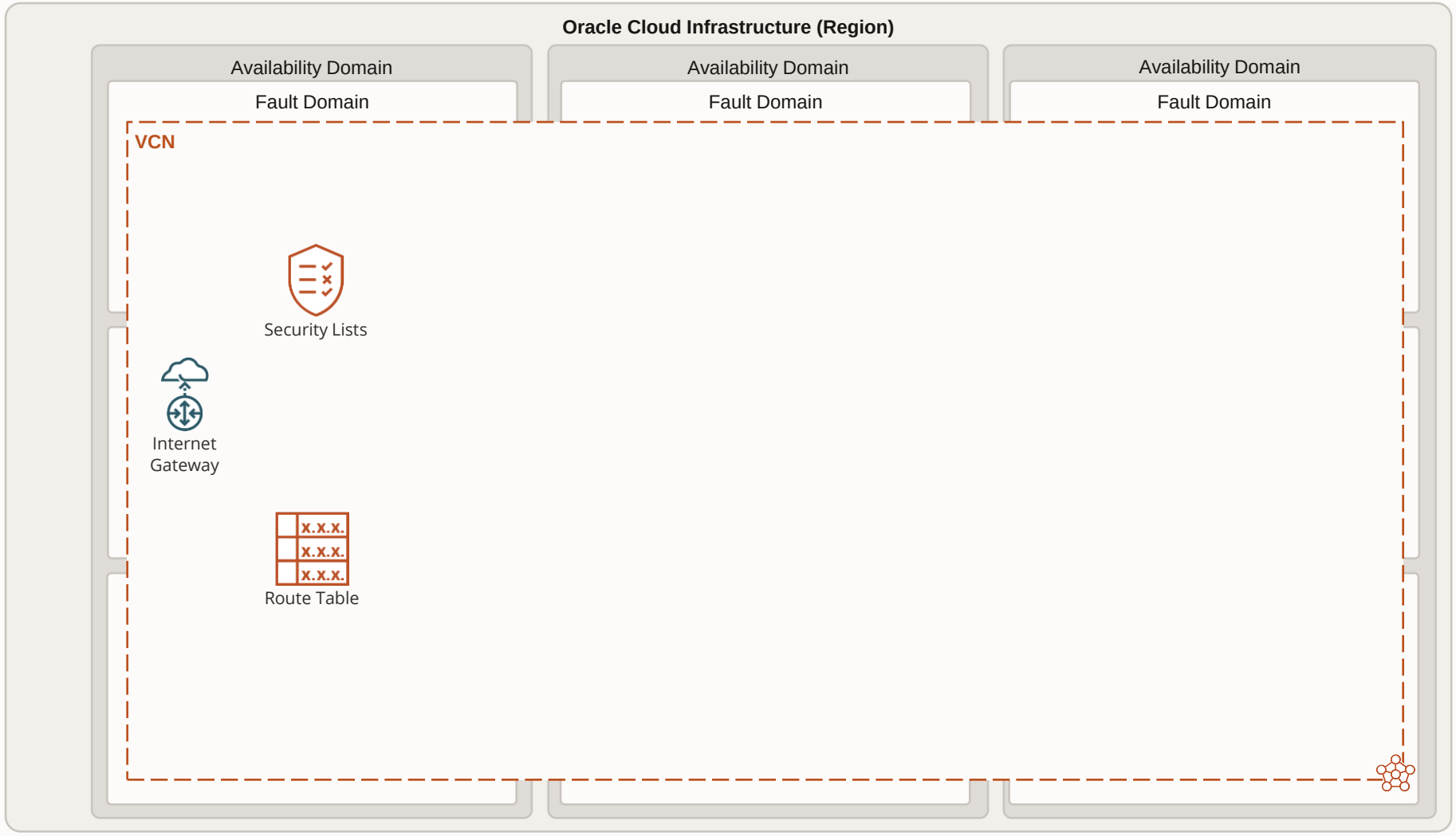
選擇您所在位置附近的地區

全球 24 個地區、32 個可用域



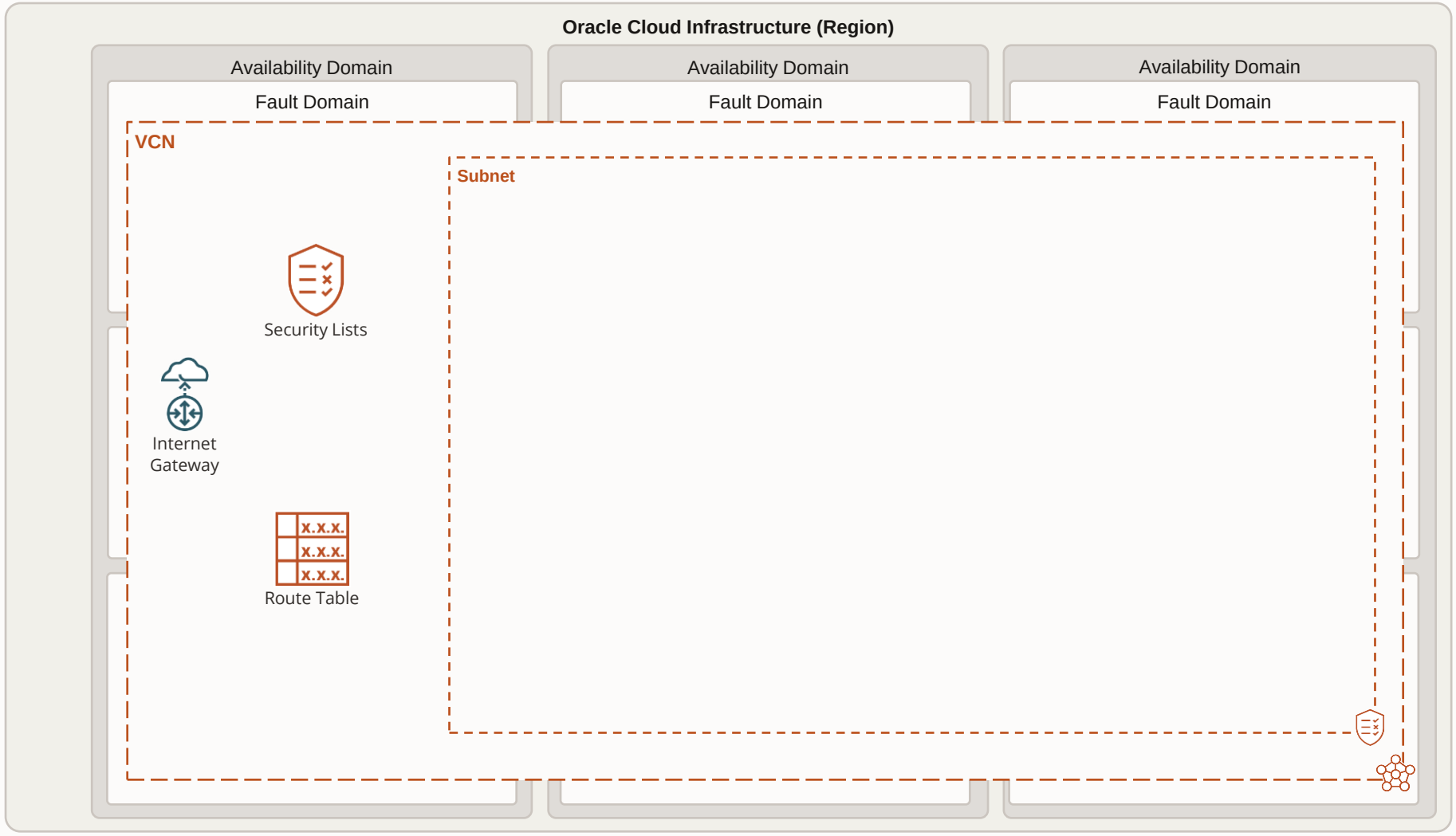
開通虛擬雲端網路(VCN)

可以在區域上配置 VCN

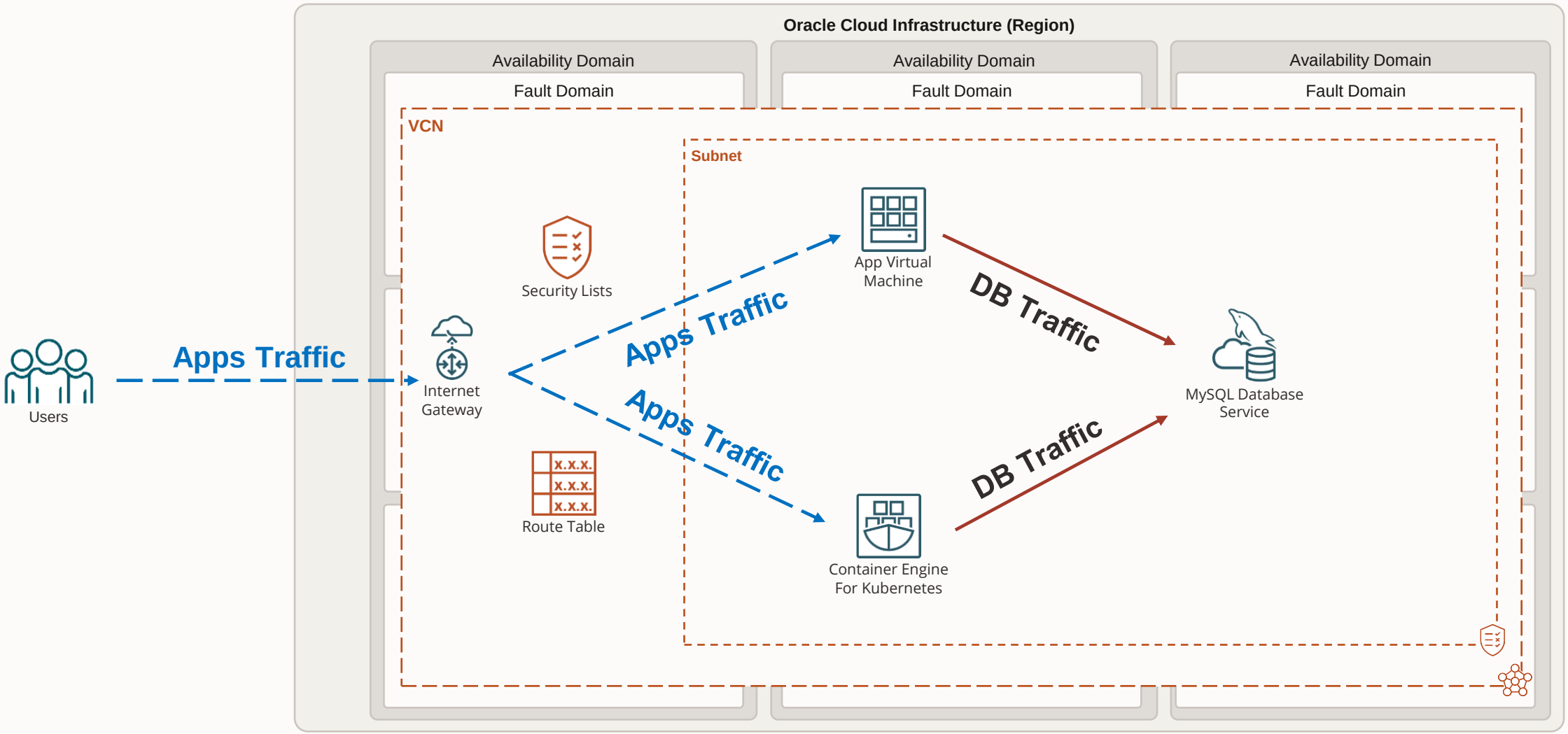


開通子網路

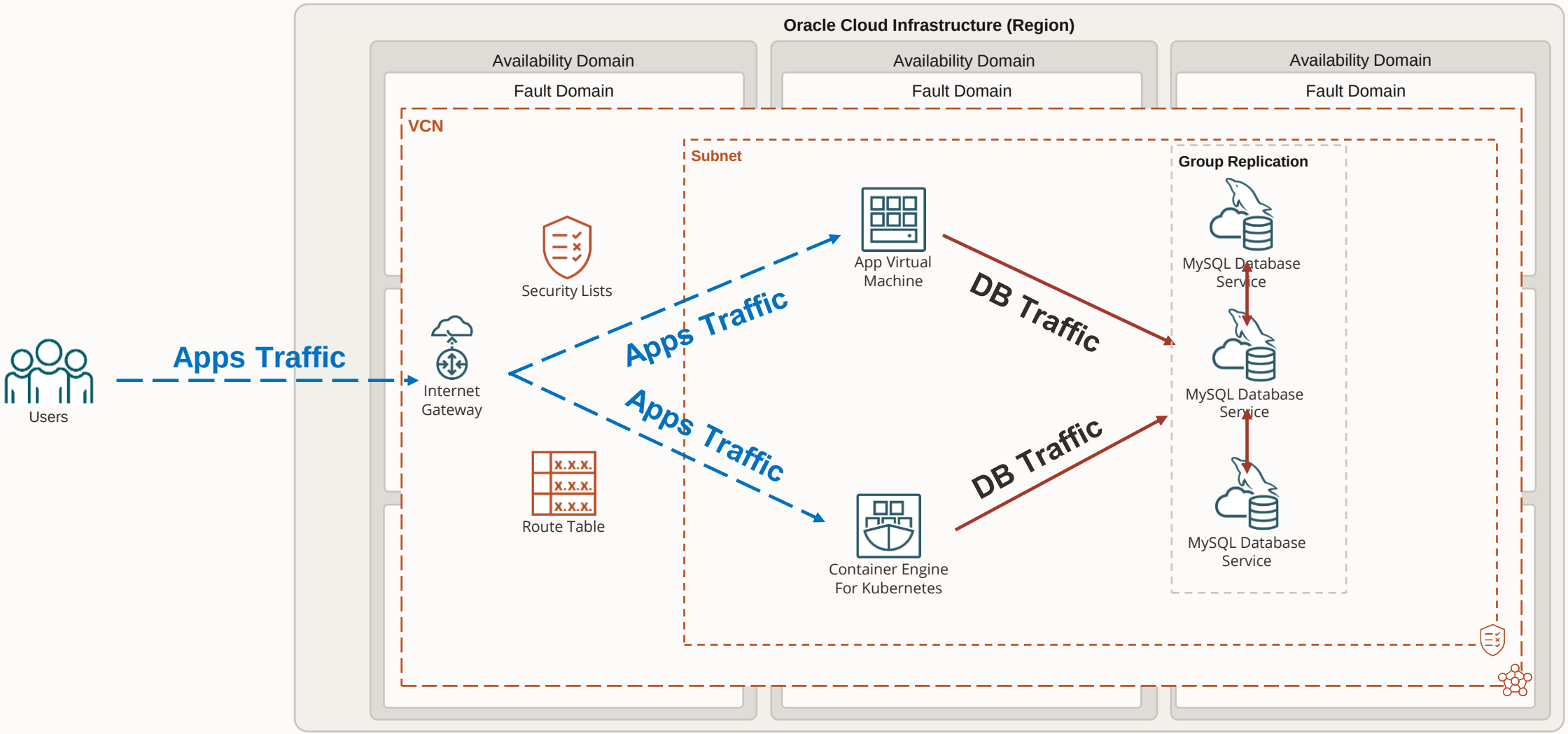
子網可以是 PUBLIC 或 PRIVATE 子網路



開通 MySQL Database Service – 單機

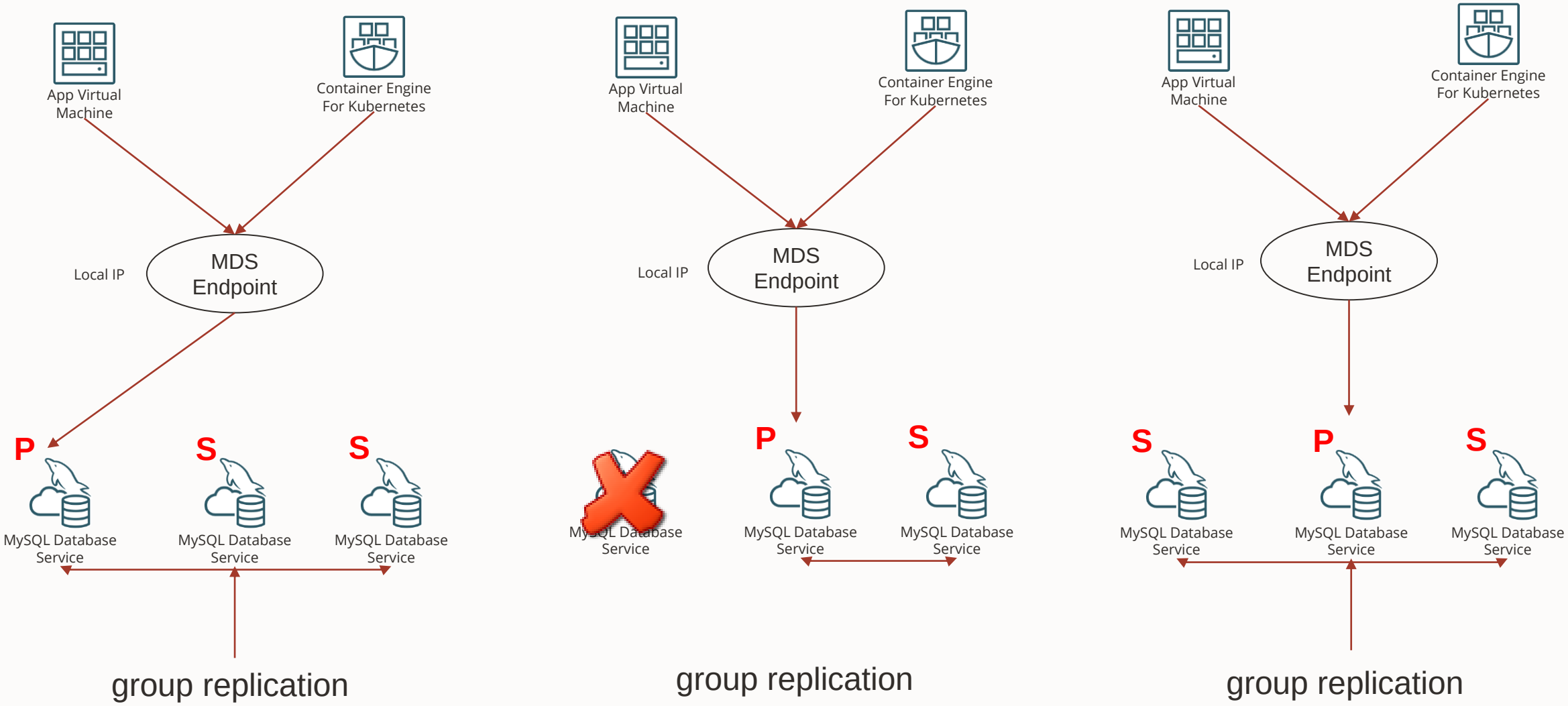


MySQL Database 可以是高可用模式



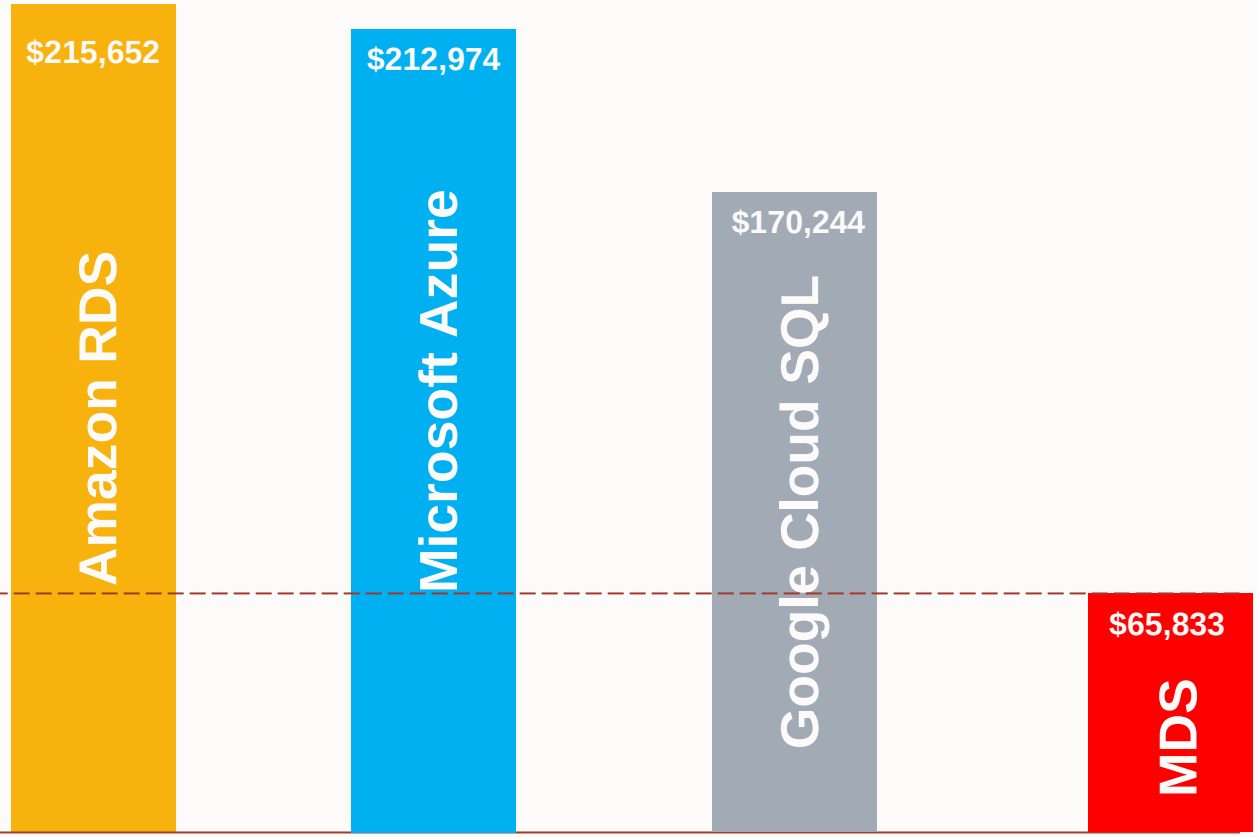
以MySQL Group Replication 支援高可用

所有實例都是開的,故障移轉不需開機備用實例,不用崩潰回復,能rolling upgrade大幅增進SLA



相對其他MySQL雲服務成本可以降低 70%

MySQL Database Service: 1 Year TCO
100 OCPUs, 1TB Storage



MySQL Database Service: Standard E3 AMD 16GB/Core, all regions have the same price.
Amazon RDS: Intel R5 16GB/Core, AWS US East.
Azure: Memory Optimized Intel 20GB/Core, MS Azure US-East.
Google: High Memory N1 Standard Intel 13GB/Core, GCP Northern Virginia.
Configuration: 100 OCPUs, 1 TB Storage.

只需~ 30%的成本

每年省 ~ 4佰萬

inbound traffic is FREE and outbound traffic is FREE for the first 10 TB per month

MySQL Database Service: 可供選擇的配置

A shape determines the options for resources such as core count, and memory size. For more information about shapes, see System Configuration.

All Types ✓ | Virtual Machine | Bare Metal

Available Shapes

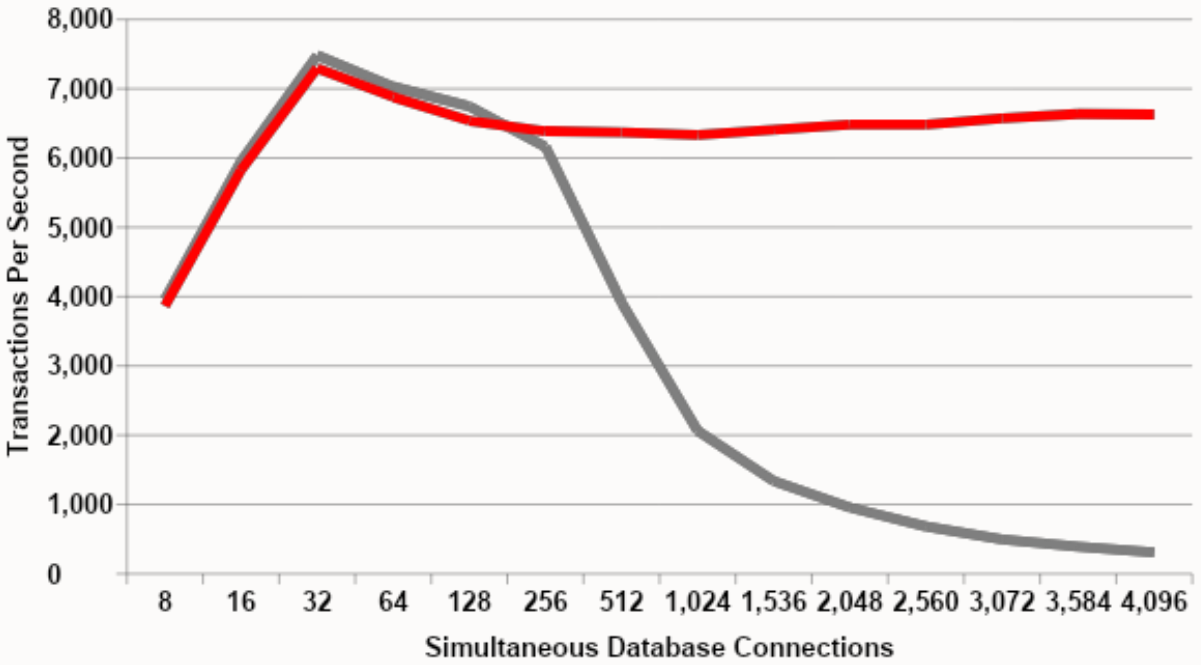
Name	Supports HeatWave	CPU Core Count	Memory Size
MySQL.VM.Standard.E3.1.8GB	No	1	8 GB
MySQL.VM.Standard.E3.1.16GB	No	1	16 GB
MySQL.VM.Standard.E3.2.32GB	No	2	32 GB
MySQL.VM.Standard.E3.4.64GB	No	4	64 GB
MySQL.VM.Standard.E3.8.128GB	No	8	128 GB
MySQL.VM.Standard.E3.16.256GB	No	16	256 GB
MySQL.VM.Standard.E3.24.384GB	No	24	384 GB
MySQL.VM.Standard.E3.32.512GB	No	32	512 GB
MySQL.VM.Standard.E3.48.768GB	No	48	768 GB
MySQL.VM.Standard.E3.64.1024GB	No	64	1,010 GB
MySQL.HeatWave.VM.Standard.E3	Yes	16	512 GB

0 Selected

Showing 11 Items

以MySQL Database Service (MDS)加強性能和容量

具有 MySQL 企業版的線程池的可使擴展性加大 20倍

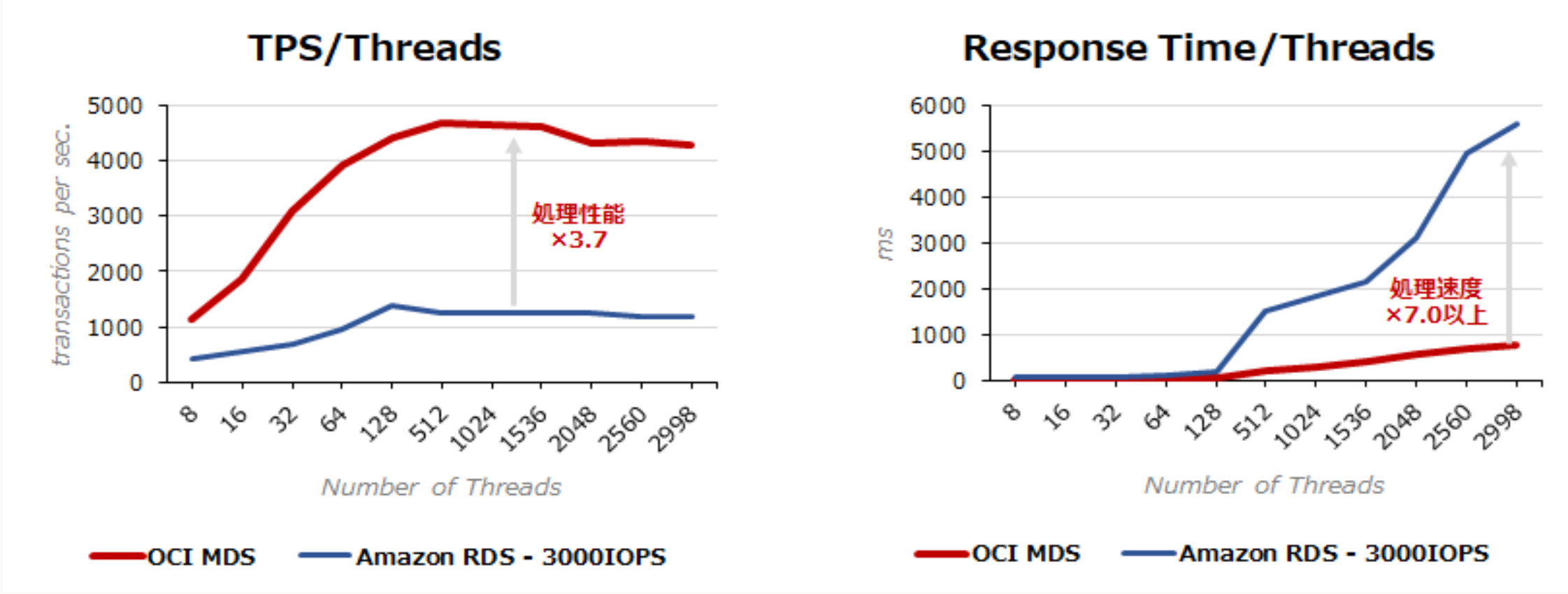


MySQL Database Service (MDS)
基於 MySQL 企業版的Thread Pool

MySQL 社群版
沒有 MySQL 企業版的Thread Pool

MDS和AWS RDS的性能的比對

- https://blog.s-style.co.jp/2021/02/7329/



RDS	-Db.r6g.4xlarge（16个vCPU / 128GB） -MySQL 8.0.21（最新可选版本）-存储：预置SSD 200GB（3000IOPS）/ 300GB（15000IOPS）（* 2）
sysbench执行服务器（EC2）	· T3a.xlarge（4个vCPU / 16GB RAM） · 存储：200GB （* 1） · NW带宽：最大5 Gbps

MDS	-MySQL.VM.Standard.E3.8.128（8个OCPU / 128GB） -MySQL 8.0.22-存储空间：200GB
sysbench执行服务器（Compute Instance）	· VM.Standard.E3.Flex（4个OCPU / 16GB RAM） ·存储：200GB （* 1） · NW带宽：4 Gbps

MySQL Database Service:價格

Comparison US$ per Month (PAYG)

	MySQL Database Service	AWS RDS MySQL	Azure MySQL	Google CloudSQL MySQL
Standard memory per Physical core/month	**$41.37** Standard.E3 AMD Rome (8GB/core)	**+208%** $127.22 M5 Intel (8GB/core)	**+217%** $ 130.94 General Purpose Intel (10GB/core)	**+160%** $ 107.58 N1-standard Intel (7.5GB/core)
High memory per Physical core/month	**$54.46** Standard.E3 AMD Rome (16GB/core)	**+228%** $ 178.56 R5 Intel (16GB/core)	**+224%** $ 176.33 Memory Optimized Intel (20GB/core)	**+157%** $ 140.17 N1-highmem Intel (13GB/core)
Storage (Data) per GB/month	**0.040**	**+188%** 0.115 General Purpose (SSD) Storage	**+188%** 0.115 General Purpose/Memory Optimized Storage	**+325%** 0.170 SSD provisioned
Backup per GB/month	**0.040** (with free quota)	**+138%** 0.095 (with free quota)	**+150%** 0.100 (with free quota)	**+100%** 0.080 (no free quota)

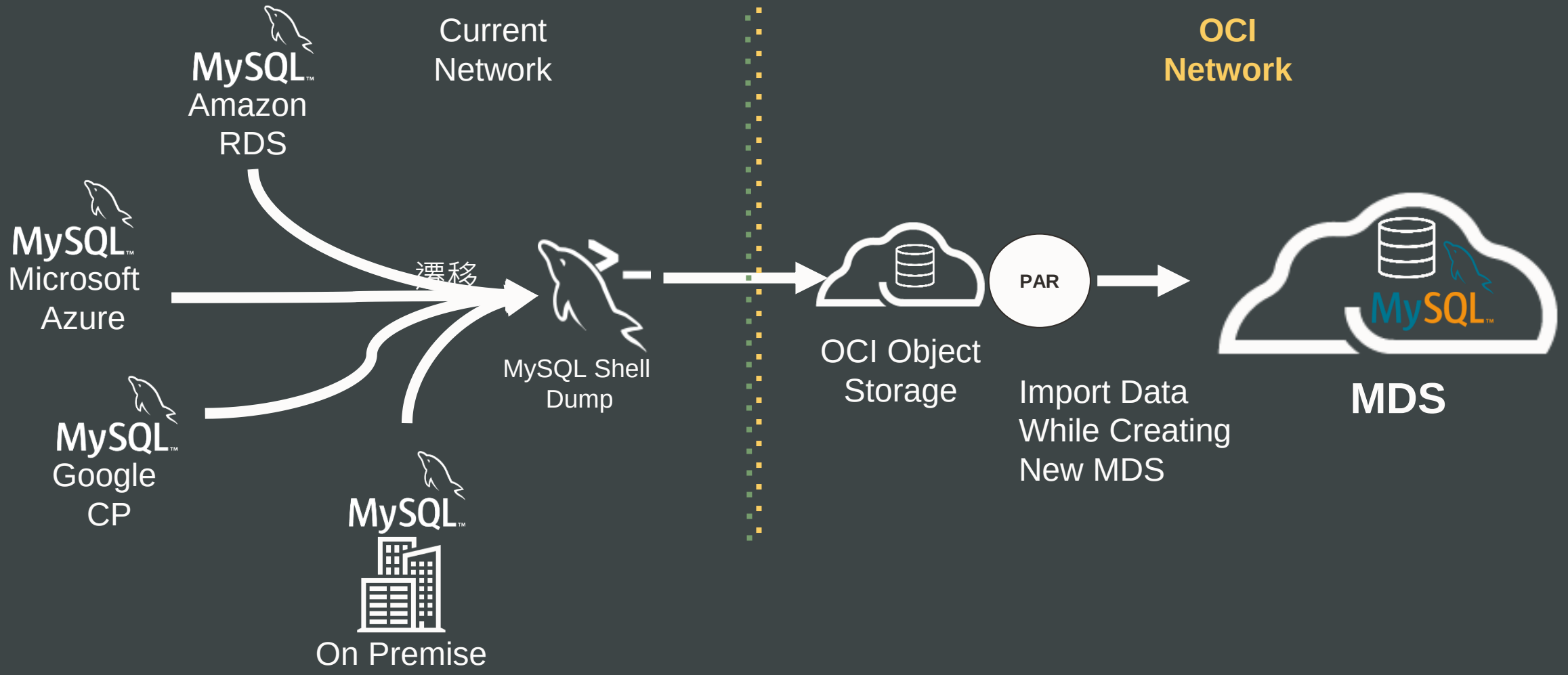
MySQL Database Service 和 Ali RDS的成本比较

Comparison US$ per Month (PAYG)

	MySQL Database Service 单机和高可用	阿里云 MySQL RDS 金融版
单机基础版,低内存 per Physical core/month	**$45** Standard.E3 AMD, 1 OCPU (equivalent to 2vCPU) 8GB RAM, 100 GB Storage, **6,000 IOPS**	**+ 0 %** **$45** (CNY 290) mysql.n4.medium.1, 2 vCPU, 8GB RAM
高可用,低内存 per Physical core/month	**$135 (45 * 3)** Standard.E3 AMD, 1 OCPU (equivalent to 2vCPU) HA 16GB RAM, 100 GB Storage, **6,000 IOPS**	**+38%** **$186** (CNY 1200) Financial Edition mysql.n2.large.25, 2vCPU, 8GB RAM, **5,000 IOPS**
高可用,高内存 per Physical core/month	**$351 (117 * 3)** Standard.E3 AMD, 2 OCPU (equivalent to 4vCPU) HA 32GB RAM, 200 GB Storage, **12,000 IOPS**	**+86%** **$652** (CYN 4020) Financial Edition mysql.x8.large.3, 4vCPU, 32GB RAM, **9,000 IOPS**
存储 (Data) per GB/month	**$ 0.040** /1GB Month, NVMe Storage	**+375%** $ 0.19 /GB Month General Purpose (SSD) Storage
附注	MDS HA是基于MySQL Group Replication	阿里金融版是基于MySQL Group Replication

Ali CPU and vCPU: https://www.alibabacloud.com/help/tc/doc-detail/145895.htm
based on Ali N. China price scheme: https://cn.aliyun.com/price/product#/rds/detail , the price will be +50% if use data center outside of China
Ali RDS is count with vCPU: https://www.enterprisestorageforum.com/products/alibaba-apsaradb-product-overview-and-insight/
Currency rate is based on 16th Sept. exchange rate

想要遷移資料庫到 MySQL 資料庫服務?



1. 以MySQL Shell 導出資料到Object Storage

多線程可中繼的資料導出

SYNTAX: util.dumpInstance(outputUr
)/util.dumpSchema()/util.dumpTable()

outputUr
l

option
s

Filtering Options

MDS Consistency Options

- ocimds
- consiste nt

OCI Options

- osBucketNa me
- osNamespac e
- ociConfigFile
- ociProfile

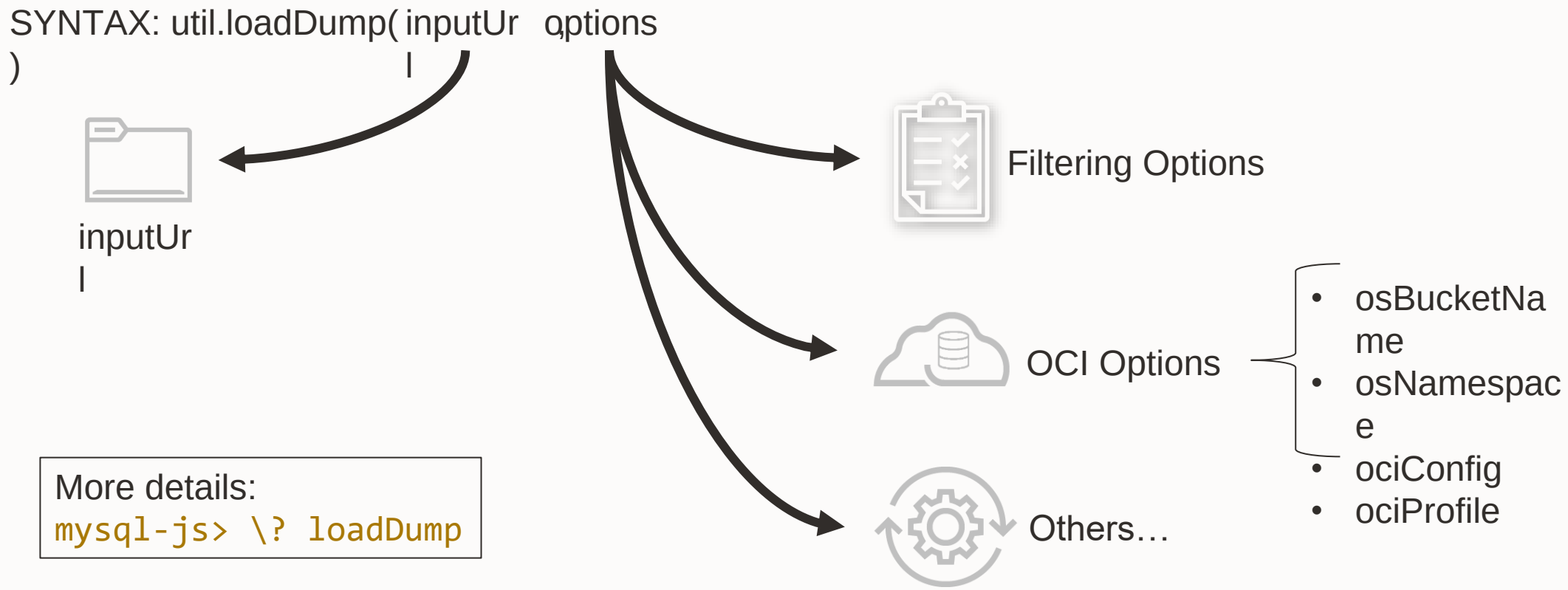
Others…

More details:

```
mysql-js> \? dumpInstance
```


2. 導入資料到MDS之一 - MySQL Shell Migration

Dump Load 指令



More details:

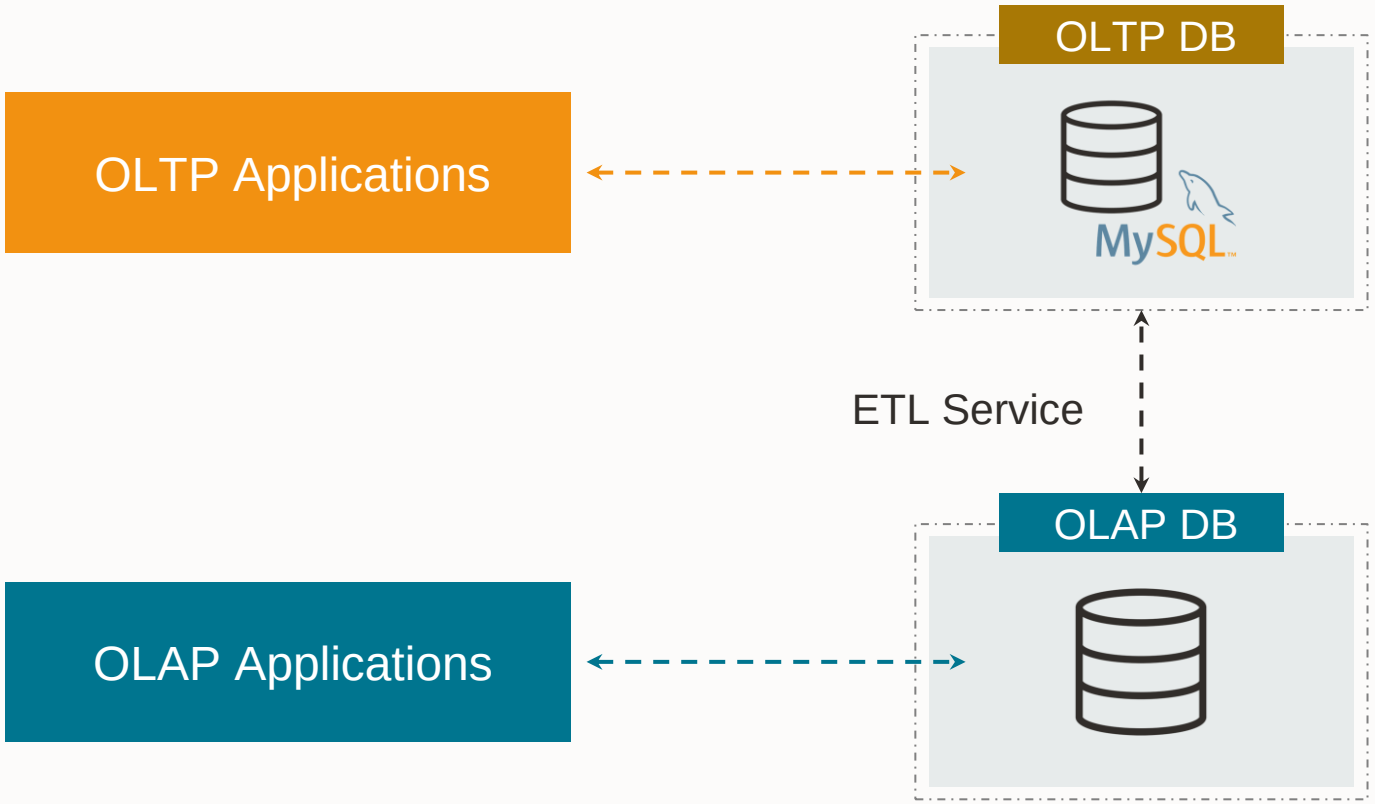
```
mysql-js> \? loadDump
```

使用 MySQL Heatwave 使查詢性能加速400倍

如果您有以下問題,請留意以下的內容:

- 在做複雜查詢或大資料查詢有性能的問題嗎?
- 為了產生分析性報告必需搬移大量資料嗎?
- 無法及時提供分析性報告,以致無法因應市場的變化嗎?
- 受限於現有的技術,無法對更大量的資料做更複雜,更深度的分析嗎?
- 大資料分析的成本太高,不能普遍的應用

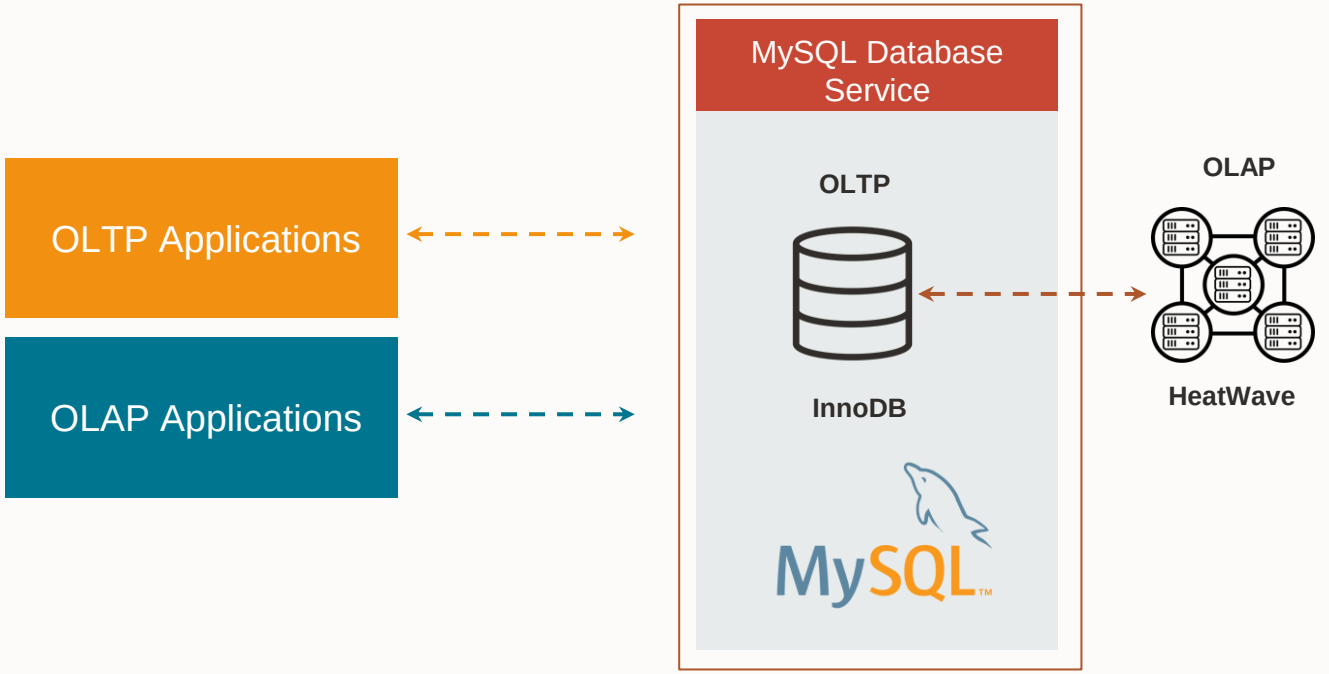
典型的部署：
OLTP 和 OLAP 是獨立系統



你怎樣才能使它更容易實施和維護？
如何讓它更容易使用？
如何讓 OLTP DB 運行得更快？
如何有實時的 OLAP 報告？
如何降低複雜度？
如何減少技術環境足跡和成本？

具HeatWave的MySQL Database Service

輕鬆對 MySQL 資料庫運行高性能分析，無需 ETL



用於 OLTP 和分析應用程式的單個 MySQL 資料庫

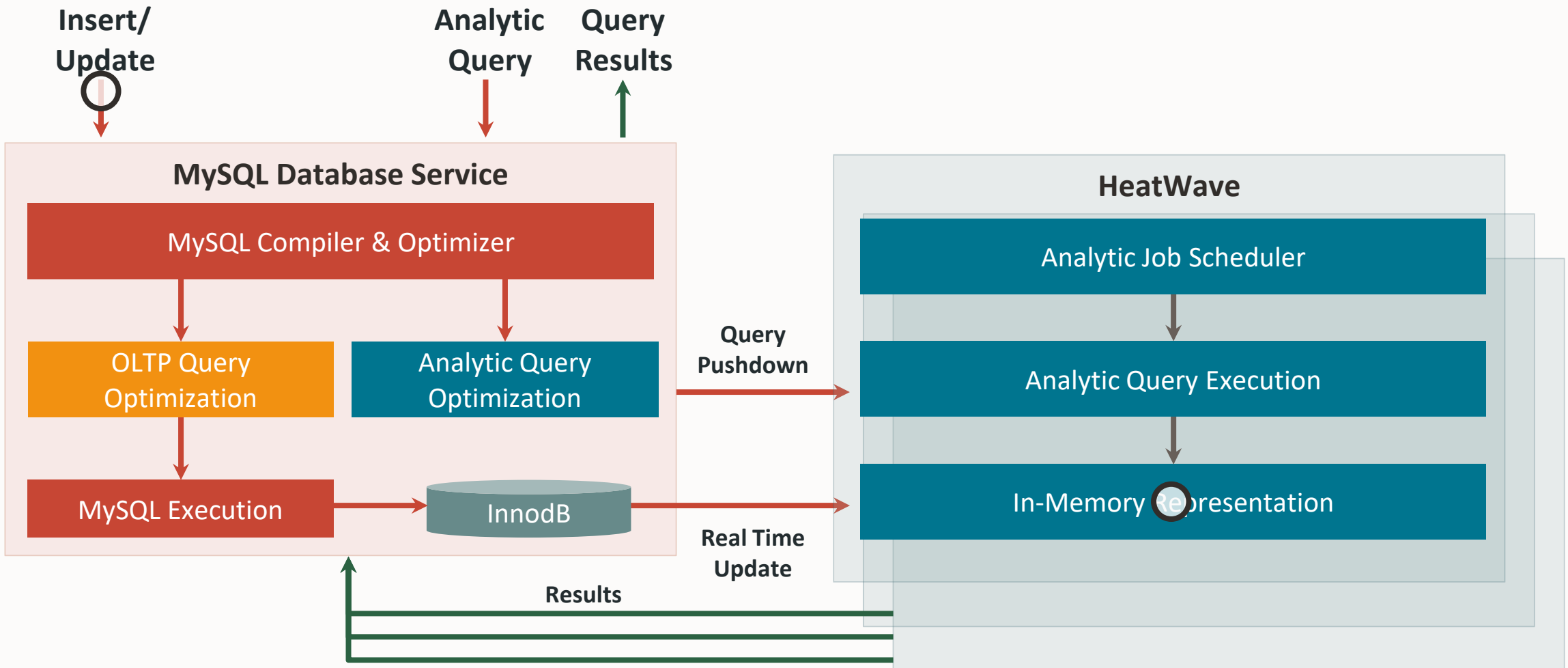
所有現有應用程式無需任何更改即可運行

極致性能：比 MySQL 快 400 倍，可擴展到數千個內核

“By 2022, public cloud services will be essential for 90% of data and analytics innovation.”
Gartner

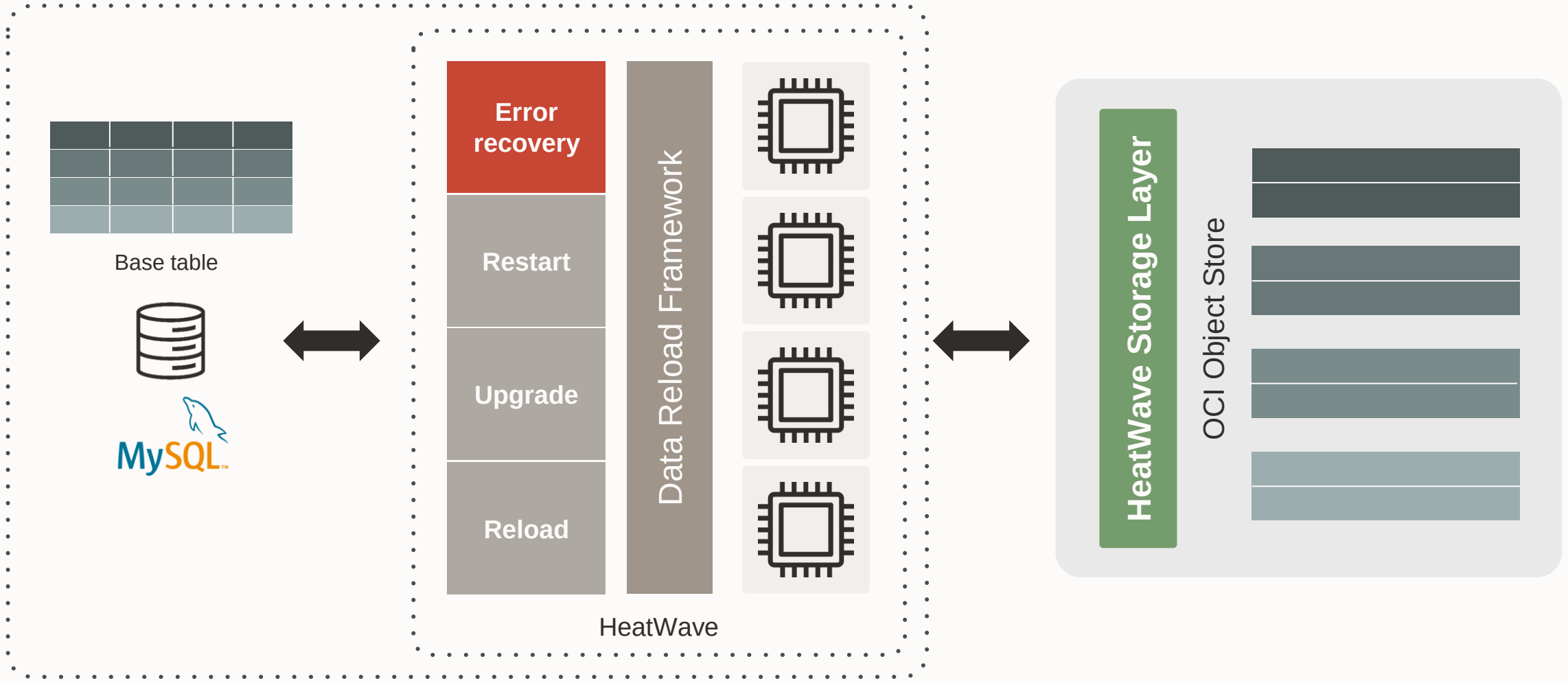
具HeatWave的MySQL Database Service

在 MySQL 中的資料變更可在一秒鐘內就能用於分析查詢



MySQL HeatWave 的橫向擴展力

重新加載任何數量的資料的時間是固定的

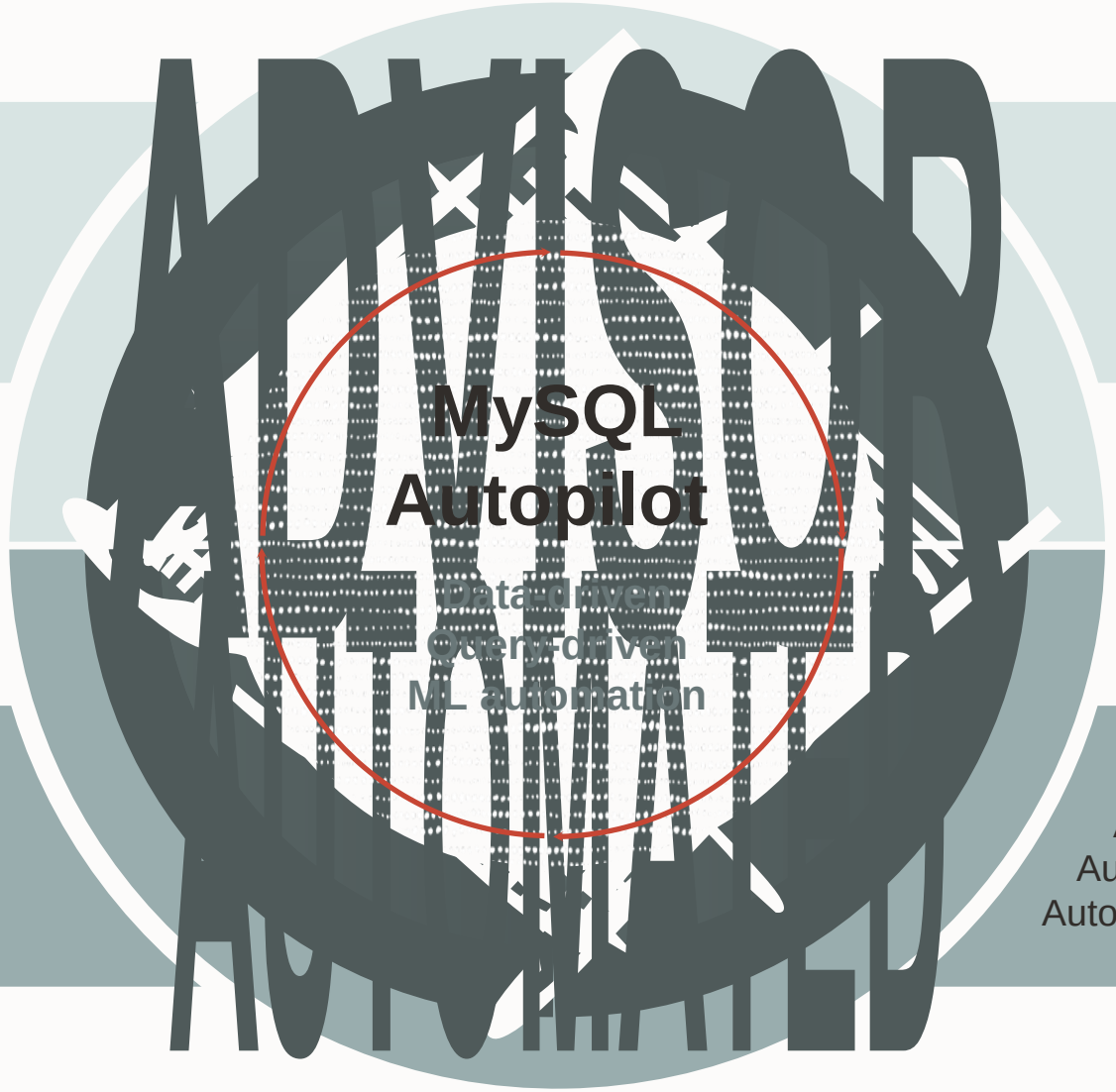


MySQL HeatWave以machine-learning為基礎的自動化

持續改進 - 好,還要更好

Auto Provisioning

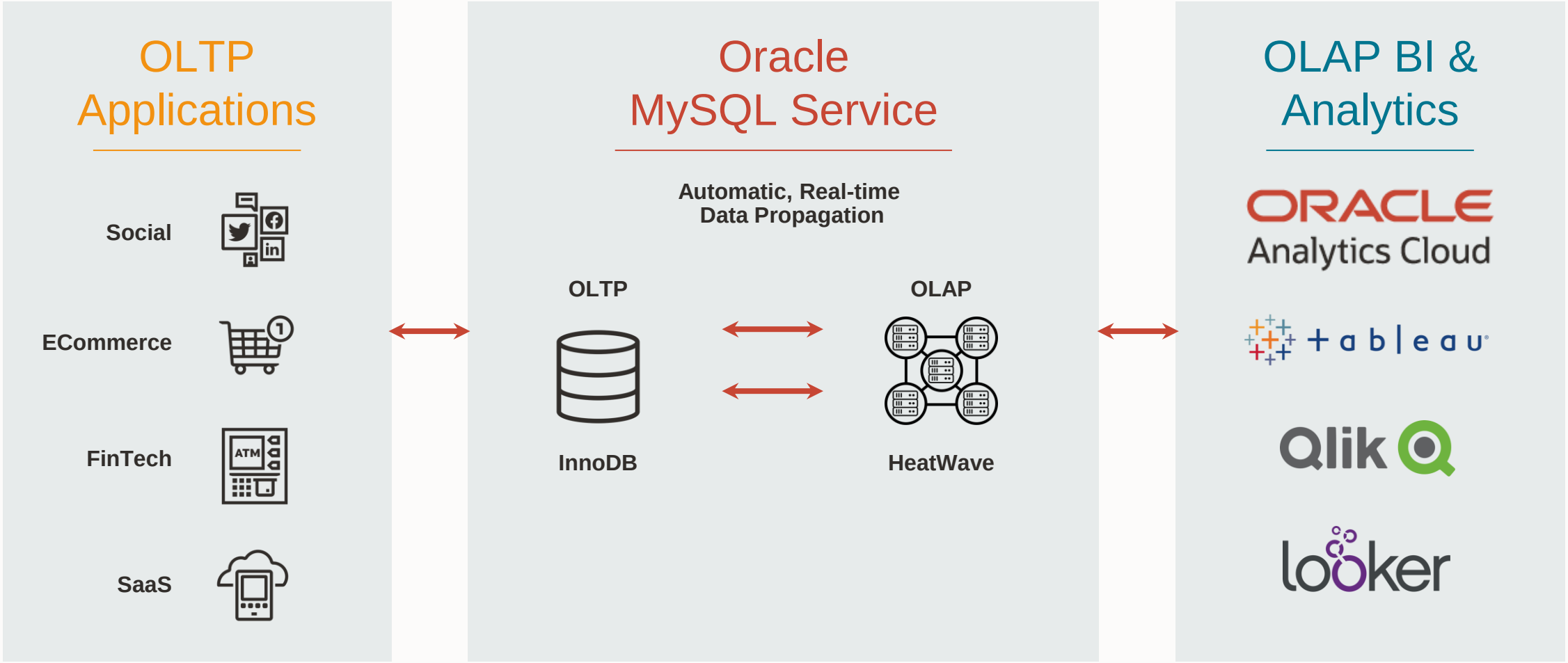
Auto Parallel Loading
Auto Data Placement
Auto Encoding



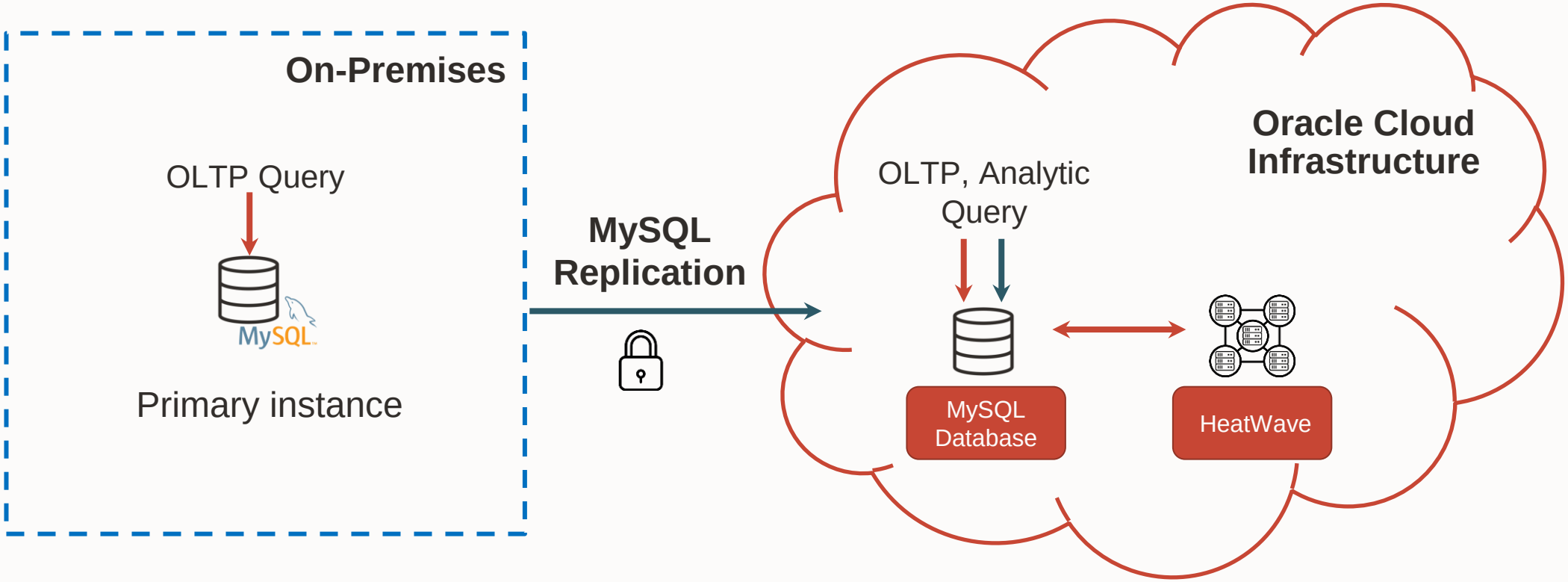
Auto Error Recovery

Auto Scheduling
Auto Change Propagation
Auto Query Time Estimation
Auto Query Plan Improvement

所有與 MySQL 兼容的分析應用程式 無需任何更改即可運行



透過複製輕鬆對本地 MySQL 資料庫做分析

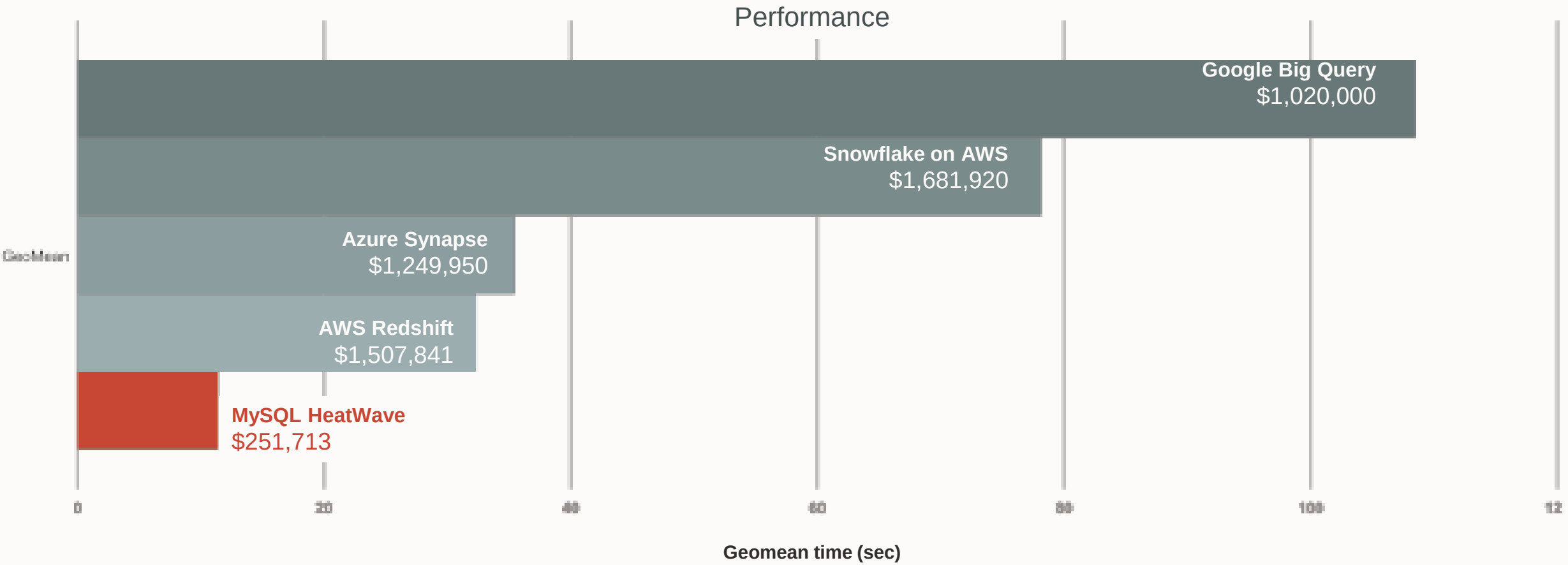


現有的本地應用程式

在雲端做分析處理

所有主流大數據方案的性能和價格比

以30TB TPCH測試, HeatWave 比所有競爭者快3-10倍,價格又只有別人的1/4 – 1/5



3rd party numbers derived from Gigaom report of Oct 2020

Using PAYG pricing for Snowflake. Other prices are based on **1 year** pricing

*Benchmark queries are derived from TPC-H benchmark, but results are not comparable to published TPC-H benchmark results since they do not comply with TPC-H specification.

演示

1. 試試看HeatWave能帶來多大的性能提升?
   - select count(*) from patient;
   - explain select count(*), continental from country c,patient pt, province p where p.countryid=c.id and pt.provinceid=p.id group by continental order by continental;
   - select count(*), continental from country c,patient pt, province p where p.countryid=c.id and pt.provinceid=p.id group by continental order by continental;
   - set @@use_secondary_engine=off;

2. 由OAC儀表板看到是什麼狀況?
   - https://chuncheon3-idazzjlcjqzj-yn.analytics.ocp.oraclecloud.com/ui/
   - alter table patient secondary_unload;

成功案例分享

由AWS Aurora遷移**6TB** 的資料到,複雜查詢的性能提升 **千倍**

整體性能提升**85%**

成本比用AWS Aurora還要低**60%**

性能隨叢集的CPU核數擴增而等比增加,可擴增到數千個核

Amit Palshikar
CTO, Red3i

QBS 的MySQL Database Service經驗

在香港的一家IoT服務公司,為物流/食品/製造等行業提供設施追蹤和Location Based服務

業務需求:

- 減少用於監督服務的穩定性的人力
- 當服務下線時主動告警
- 增加雲存儲的容量

MDS 改善客戶體驗並加快上市速度:

- 提供穩定的生產環境
- 不曾發生過服務中斷
- 為客戶提供安全的資料使用
- 開發人員有一致的體驗

10+
Apps Running on MDS

20%
more on Cost Saving

“We ran the analytic workload of the Social Game Infrastructure group on MySQL with HeatWave **without requiring ETL or changing our application**. HeatWave is up to **500x** faster than our current on-premises MySQL 5.7 instance. ”

Masashi Hamahira

Senior Manager, Social Game Infrastructure Group

SQUARE ENIX CO., LTD.

TETRIS·CO

Tetris.co 為何選擇 Oracle

評估過Google BigQuery 和 AWS Redshift後, Tetris.co 將資料庫由AWS Aurora 遷移到 Oracle Cloud Infrastructure (OCI) 的 MySQL HeatWave 因而大幅增進分析的性能,同時還降低成本.
HeatWave 使Tetris.co 同仁能在同一個MySQL資料庫上做OLTP和, **不再需要搬移和整合資料**到不同的分析性資料庫.
這不僅使複雜**查詢時間由數分鐘加速到一秒以內**,而成本也只有用Aurora和RedShift時的一半.
我們在一個月內完成移,這還包括訓練和測試.

"MySQL HeatWave dramatically reduced our AWS Aurora and Redshift cost by more than 50%. We are no longer moving data around so now we have blazing fast, real-time insights with no effort. More importantly, scalability has made our expansion plan possible, allowing us to onboard more data and new clients without impact to costs. It's a dream come true."

Pablo Lemos
Cofounder and CTO, Tetris.co


FANC

Process more data, **faster and lower cost**

More automation

Secure ML-powered
Easier experience

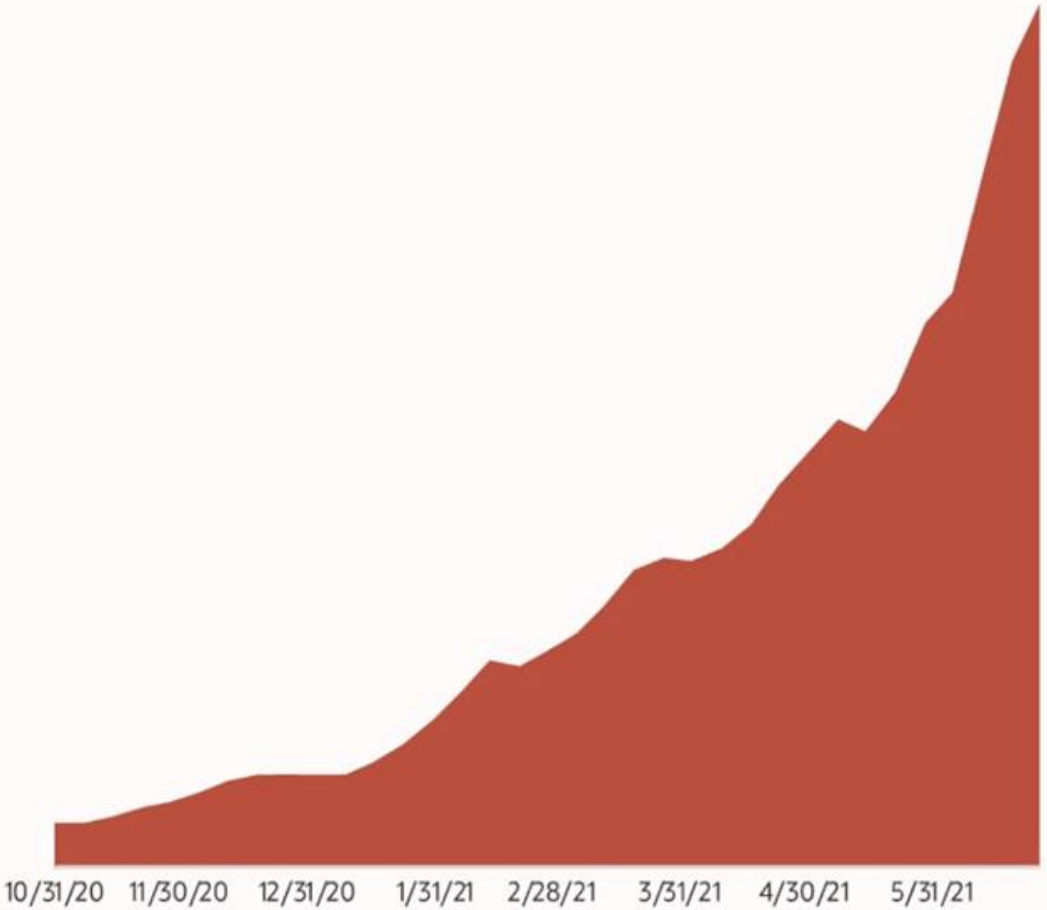
More scale

Scalability improved 20%
64 nodes supported

More performance

Best price and performance for analytic and mixed workloads
All TPCDS queries supported

Customers are using MySQL HeatWave – a lot



oracle.com/heatwave


ORACLE