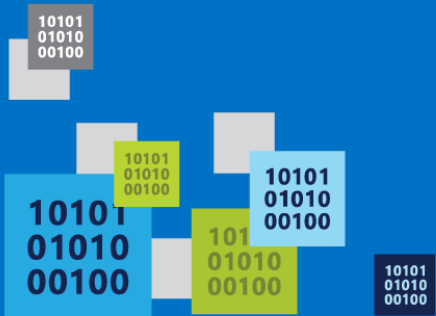


Azure 데이터

Dae Woo Kim (daewoo.kim@)
Technology Evangelist
Microsoft Korea

<https://aka.ms/azure-camp-jun>



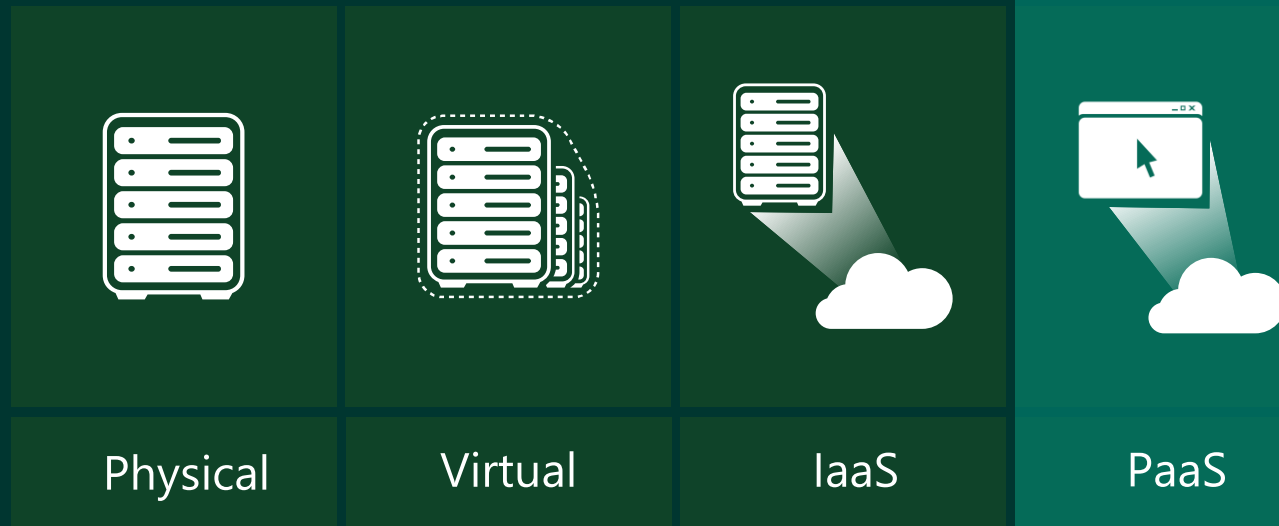
Agenda

- SQL Database
- SQL Server VM
- Cosmos DB
- Search
- HDInsight
- Additional Databases

SQL Database



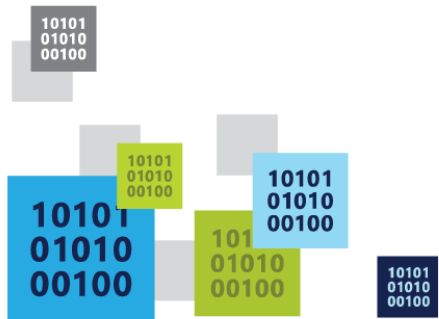
제공되는 다양한 서비스



프라이빗 클라우드부터
제공

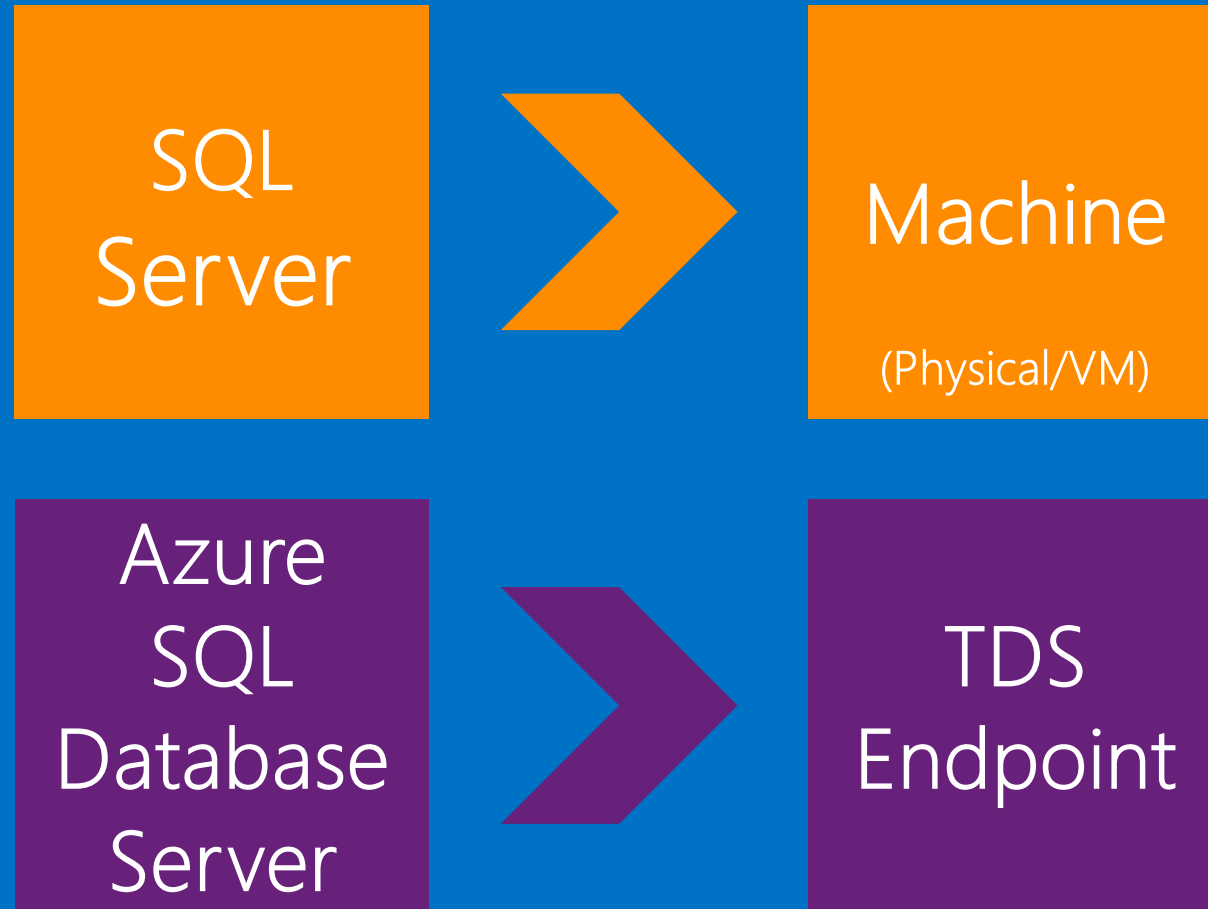
Architecture

기초부터 시작



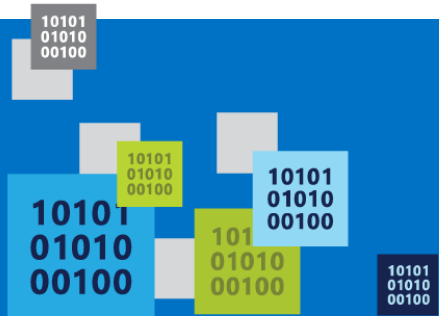
서버는 가상 환경

Microsoft Azure



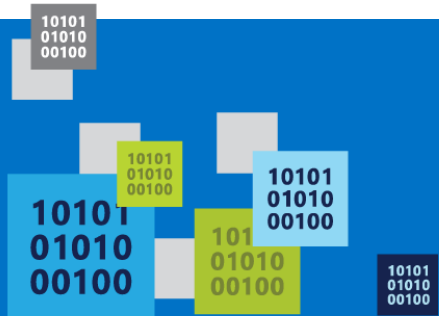
SQL Database 기초

- SQL Server 데이터베이스 기술의 "서비스화"
- 관리되는 서비스
- 엔터프라이즈 환경을 지원 HA, DR, Backups, replication 등



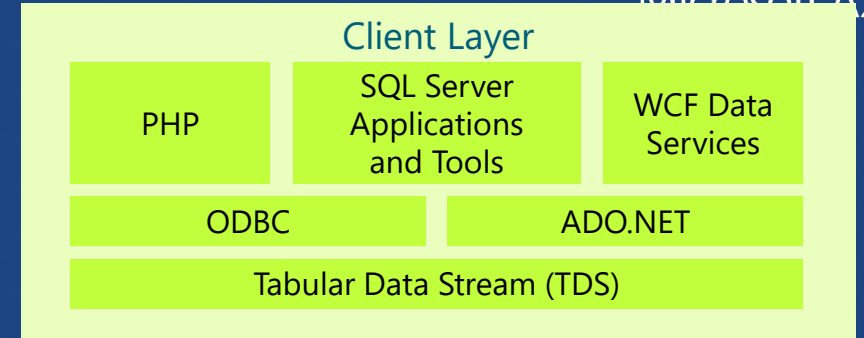
SQL Database 기초

- ElasticScale 기술로 수평확장(Scale out)
- 추가적인 데이터 보호를 위한, 내장된 지역 데이터베이스 복사본
- 99.99%의 SLA 보장



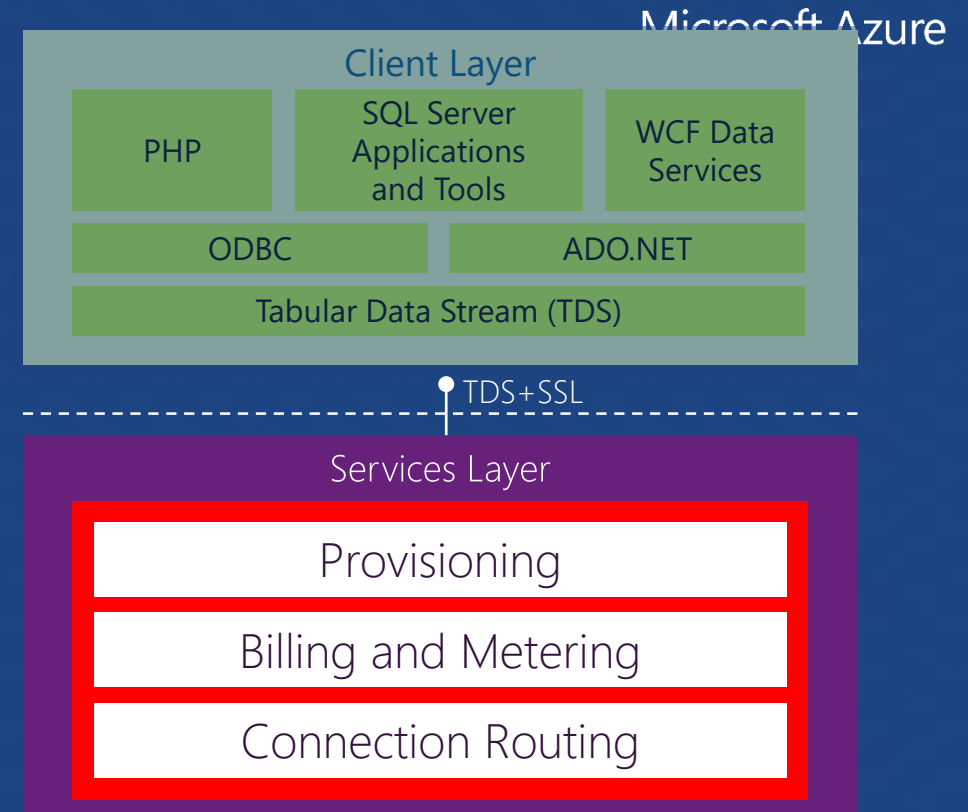
서비스 아키텍처

어플리케이션은 TDS 프로토콜로
SQL Database와 통신



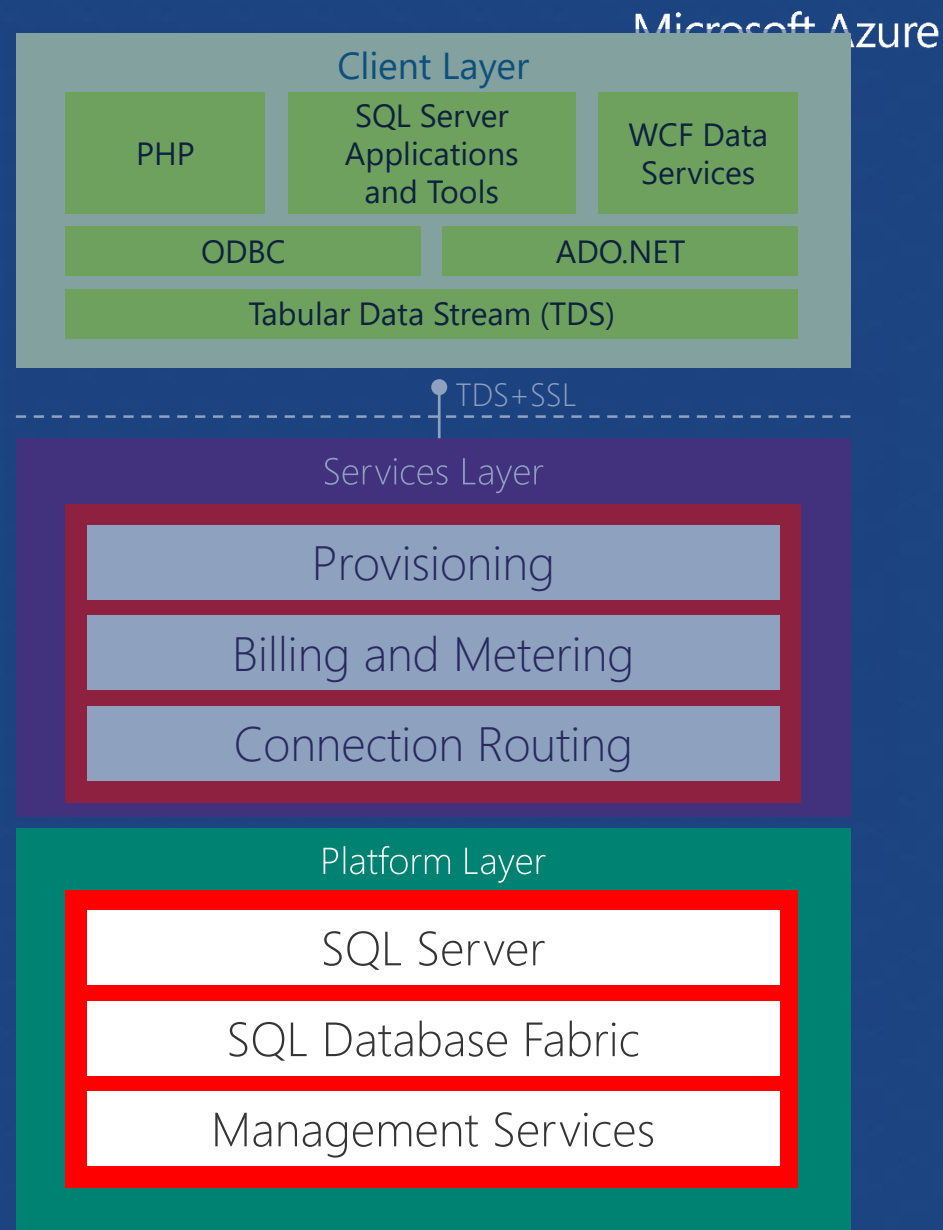
서비스 아키텍처

클라이언트와 플랫폼 레이어간 게이트웨이



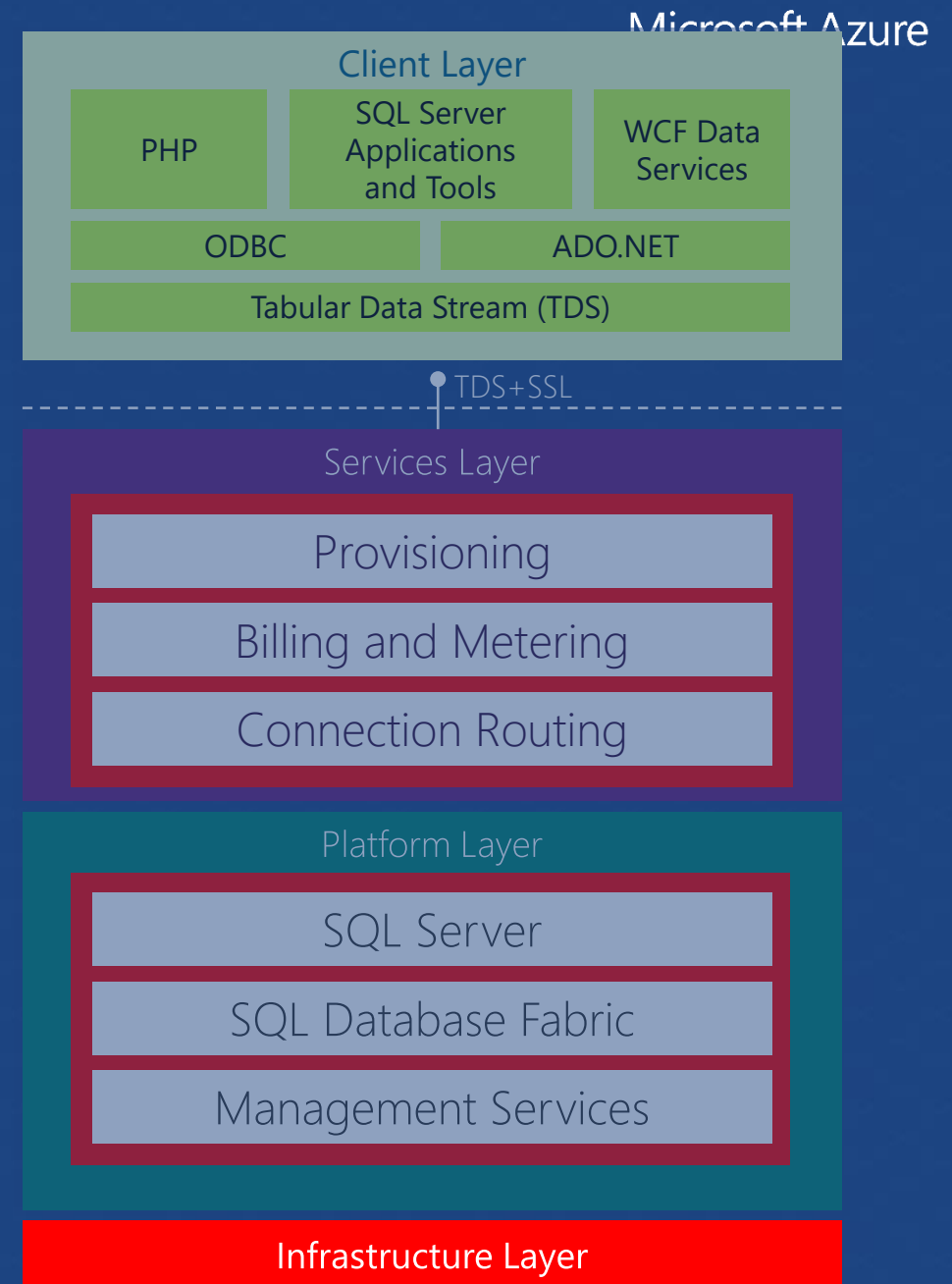
서비스 아키텍처

서비스 레이어 지원 및 물리적인 서비스



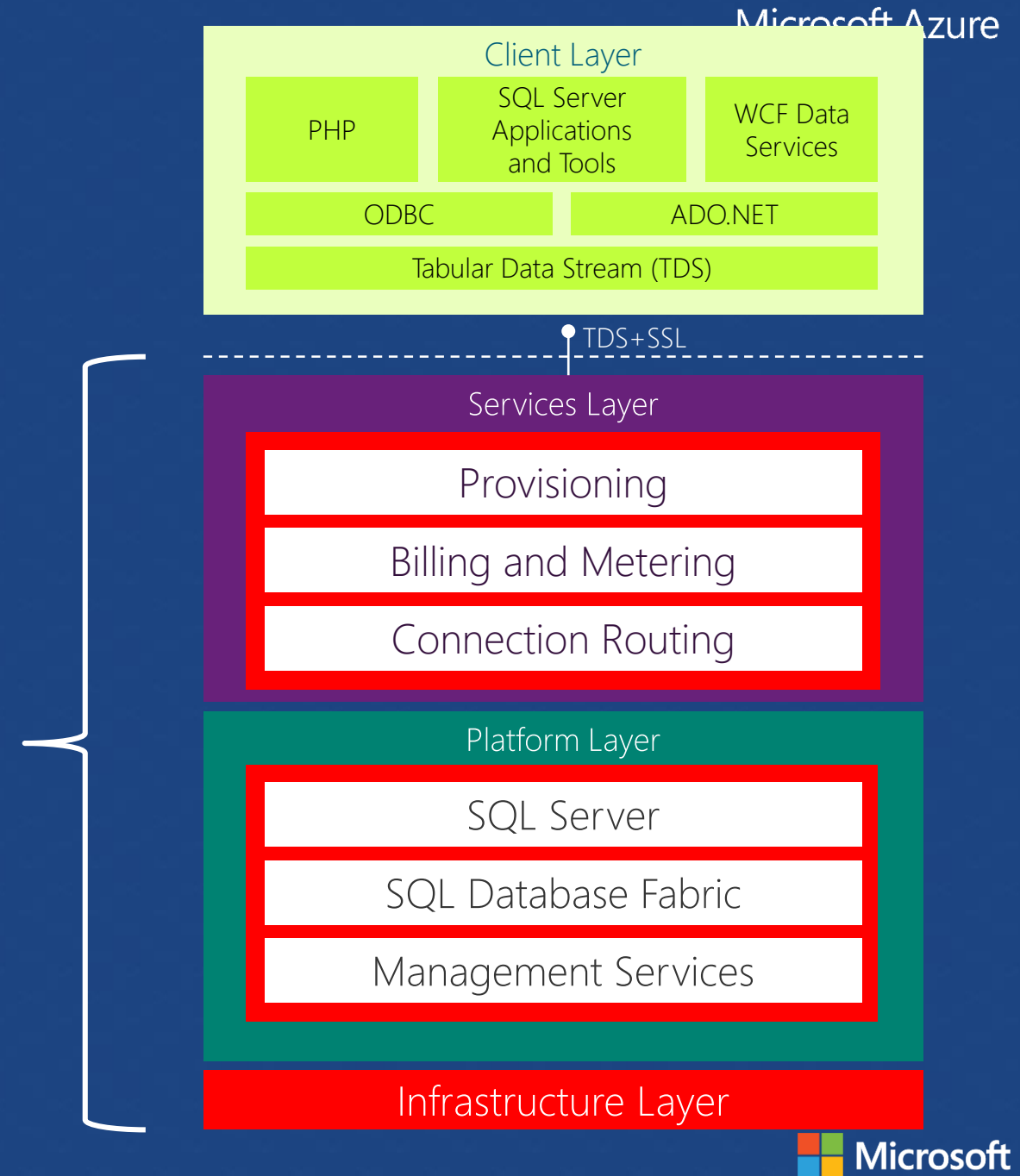
서비스 아키텍처

실제 하드웨어와 OS 관리



서비스 아키텍처

Microsoft Azure SQL Database PaaS

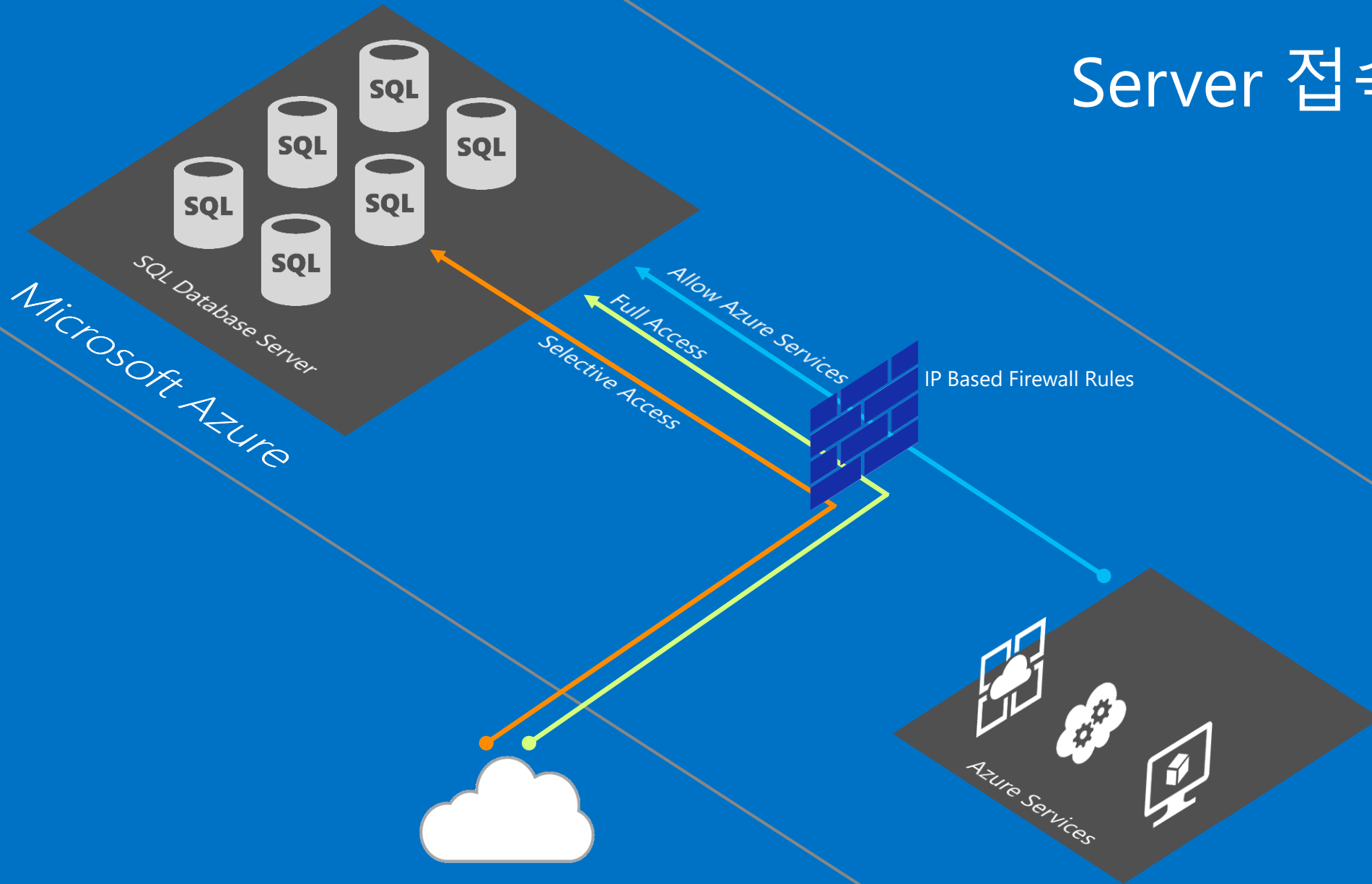


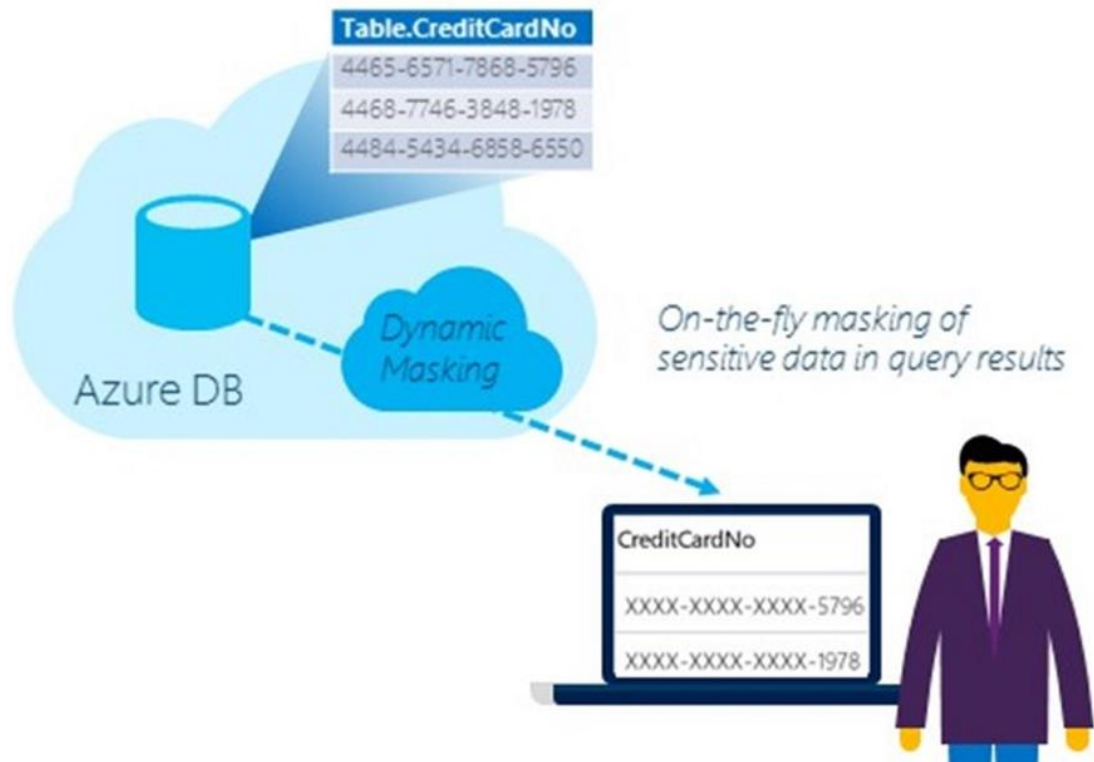
SQL Database Server

자동으로 생성된 데이터베이스
서비스로 생성시 master
데이터베이스를 포함

FQDN: {name}.database.windows.net

Server 접속

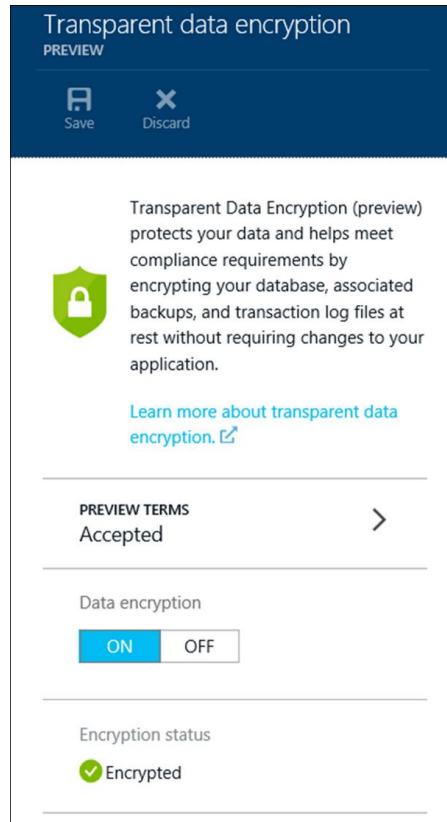




- 민감한 자료 노출 제한
- 비인가 접근 방지
- 정책 기반 보안 – 어플리케이션에 변경 없음
- 일반적인 컴플라이언스 확충
- 민감한 데이터에 대한 유출 없이 개발/테스트 가능

Protect Sensitive Data

Limit Exposure of Sensitive Data



- 데이터베이스, 백업, 트랜잭션 로그를 암호화
- 2-click 프로비전 서비스 제공
- 공격 범위를 줄임
- 기존 어플리케이션에 코드 변경 없음
- 데이터베이스 암호화 키 - AES-256
- 컴플라이언스 요건 충족
- 하드웨어 암호화에 의한 속도 증가

Encrypt and Protect Database

- 로우들에 대한 접근 제어
- 데이터베이스에 포함된 제안 로직으로 접근
- 보안에 대한 개발 작업을 단순화
- 컴플라이언스 요건 충족
- 보안상 공격 노출 범위를 감소

A decorative graphic in the bottom-left corner consisting of several overlapping squares of different colors (blue, yellow, grey, black). Each square contains a 4-line binary code (10101, 01010, 00100).

Fine-grained Access Over Rows

- Contained Database Users
- Parallel Queries
- Common Language Runtime (CLR) assemblies

A decorative graphic in the bottom-left corner consisting of several overlapping squares of different colors (blue, yellow, grey, black). Each square contains a 4-bit binary code (10101, 01010, 00100) in white or black text.

Fine-grained Access Over Rows

서버들을 배포

Microsoft Azure

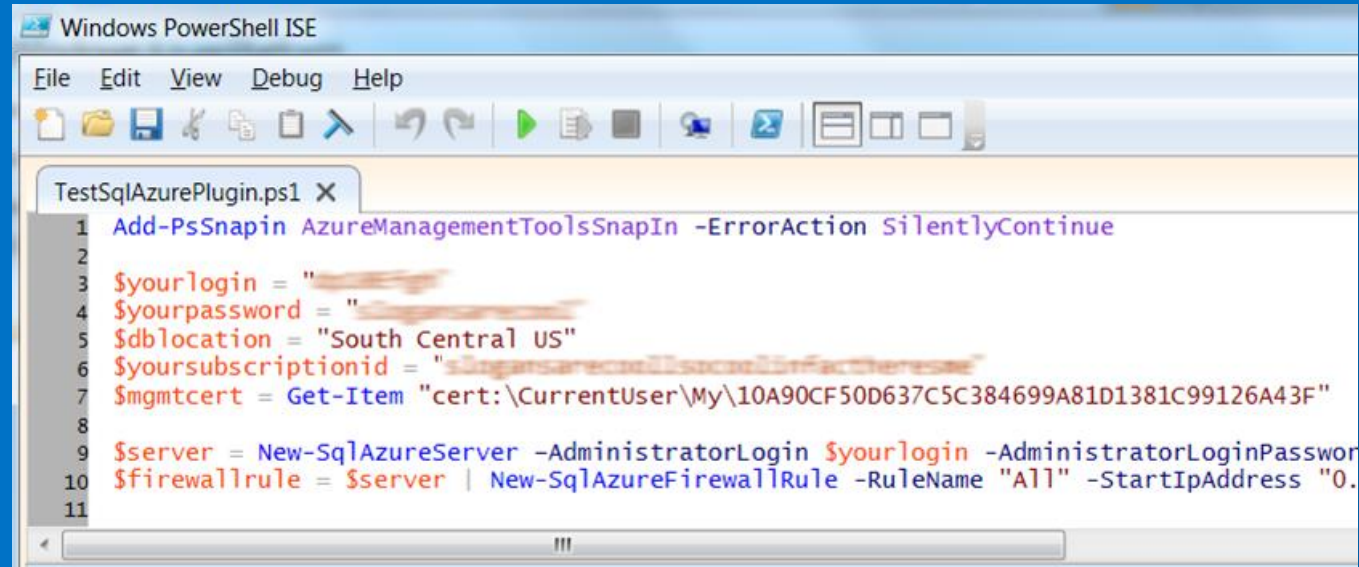
SQL Database server 생성

The screenshot shows the Microsoft Azure portal interface. The browser address bar displays `https://portal.azure.com/#`. The main content area is divided into two panels. The left panel, titled 'Server', contains a message: 'The list below contains servers compatible with your selected database or source. [Learn more](#)'. Below this message is a light blue button labeled 'Create a new server' with a right-pointing chevron. At the bottom of this panel is a grey 'Select' button. The right panel, titled 'New server', contains a form for creating a new server. It has a label 'SERVER NAME' above a text input field containing 'customnamedserver', which is followed by a green checkmark icon. Below the input field is the text '.database.windows.net'. At the bottom of this panel is a blue 'OK' button.

서버 배포 자동화

Microsoft Azure

Microsoft Azure Platform 파워셸 cmdlets



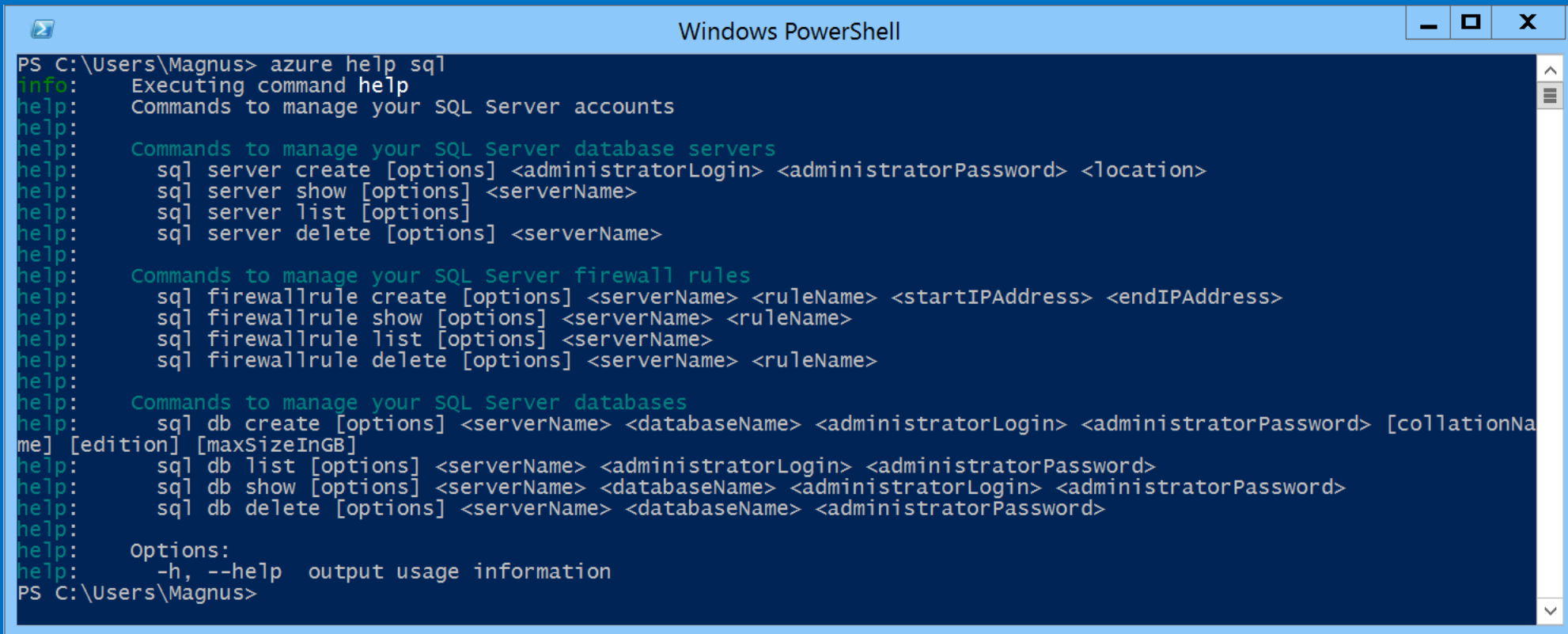
```
Windows PowerShell ISE
File Edit View Debug Help
TestSqlAzurePlugin.ps1 X
1 Add-PsSnapin AzureManagementToolsSnapIn -ErrorAction SilentlyContinue
2
3 $yourlogin = "yourlogin"
4 $yourpassword = "yourpassword"
5 $dblocation = "South Central US"
6 $yoursubscriptionid = "yoursubscriptionid"
7 $mgmtcert = Get-Item "cert:\CurrentUser\My\10A90CF50D637C5C384699A81D1381C99126A43F"
8
9 $server = New-SqlAzureServer -AdministratorLogin $yourlogin -AdministratorLoginPassword $yourpassword
10 $firewallrule = $server | New-SqlAzureFirewallRule -RuleName "All" -StartIpAddress "0.0.0.0"
11
```

<http://bit.ly/azurepowershell>

서버 배포 자동화

Microsoft Azure

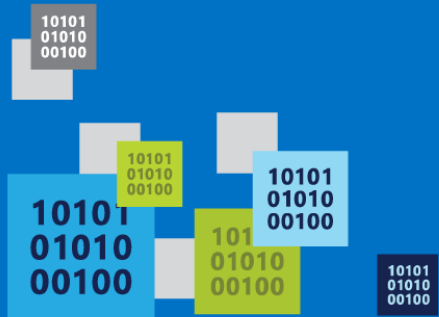
Azure 크로스 플랫폼 Command-Line 인터페이스 (xplat-cli)



```
Windows PowerShell
PS C:\Users\Magnus> azure help sql
info: Executing command help
help: Commands to manage your SQL Server accounts
help:
help: Commands to manage your SQL Server database servers
help: sql server create [options] <administratorLogin> <administratorPassword> <location>
help: sql server show [options] <serverName>
help: sql server list [options]
help: sql server delete [options] <serverName>
help:
help: Commands to manage your SQL Server firewall rules
help: sql firewallrule create [options] <serverName> <ruleName> <startIPAddress> <endIPAddress>
help: sql firewallrule show [options] <serverName> <ruleName>
help: sql firewallrule list [options] <serverName>
help: sql firewallrule delete [options] <serverName> <ruleName>
help:
help: Commands to manage your SQL Server databases
help: sql db create [options] <serverName> <databaseName> <administratorLogin> <administratorPassword> [collationName] [edition] [maxSizeInGB]
help: sql db list [options] <serverName> <administratorLogin> <administratorPassword>
help: sql db show [options] <serverName> <databaseName> <administratorLogin> <administratorPassword>
help: sql db delete [options] <serverName> <databaseName> <administratorPassword>
help:
help: Options:
help: -h, --help output usage information
PS C:\Users\Magnus>
```

<http://bit.ly/azurexplatcli>

Demo: SQL Database Server 와 SQL Database 생성



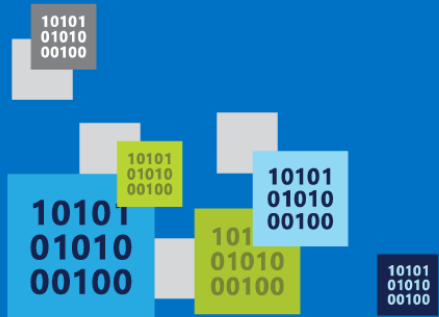
Service Tier	Performance Level	Common App Pattern	Performance			Business Continuity	
			Max DB Size	Transaction Perf. Objective	DTU	PITR	DR / GEO-Rep
Basic	Basic	Small DB, SQL opp	2 GB	Reliability / Hr.	5	7 Days	DB Copy + Manual Export
Standard	S0 S1 S2	Wrkgp/cloud app, multiple concurrent operations	250 GB	Reliability / Min.	10 20 50	14 Days	DB Copy + Manual Export
Premium	P1 P2 P3	Mission Critical, High volume, Many concurrent Users	500 GB	Reliability / sec.	100 200 800	35 Days	Active Geo-replication

다양한 P 시리즈 환경 추가됨

- 매 5분마다 자동으로 트랜잭션 로그를 백업
- Azure 저장소와 지리적 복제 위치에 백업
- 백업 retention 정책 7, 14 또는 35일
- 장기 보관이 필요한 백업본 보호를 위한 data export
논리 백업 자동화 가능

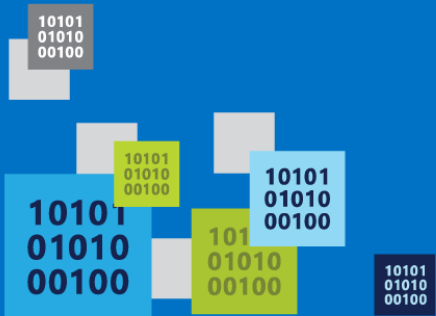
- 모든 서비스 티어에서 사용 가능
Basic, Standard 및 Premium
- geo-redundant Azure 저장소에서 사용
- 아무 지역(region)에서 복구 가능

Demo: 배포한 SQL Database에 연결



익숙한 SQL 쿼리 기술 사용

Transact-SQL



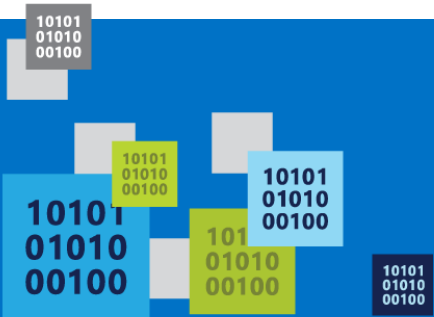
익숙한 언어를 이용해 DB에 접근

.NET Framework (C#, Visual Basic, F#): ADO.NET

C / C++: ODBC

Java: Microsoft JDBC provider

PHP: Microsoft PHP provider



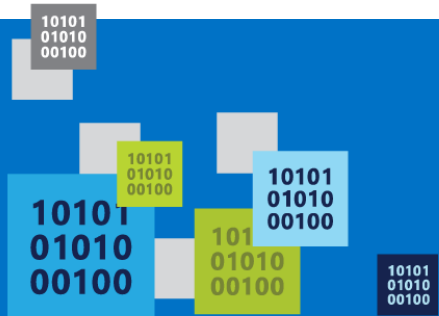
익숙한 프레임워크를 이용해 DB에 접근

OData

Entity Framework

WCF Data Services

NHibernate (etc.)

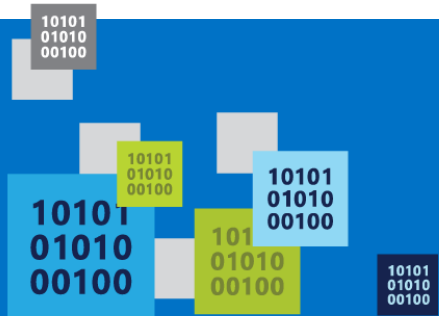


익숙한 도구들을 이용해 접근

SQL Server Management Studio (>=2008 R2)

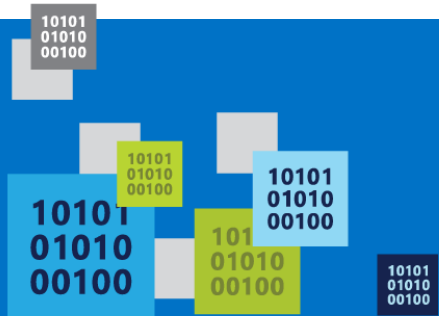
SQL Server command-line utilities (SQLCMD, BCP)

Visual Studio IDE for database development



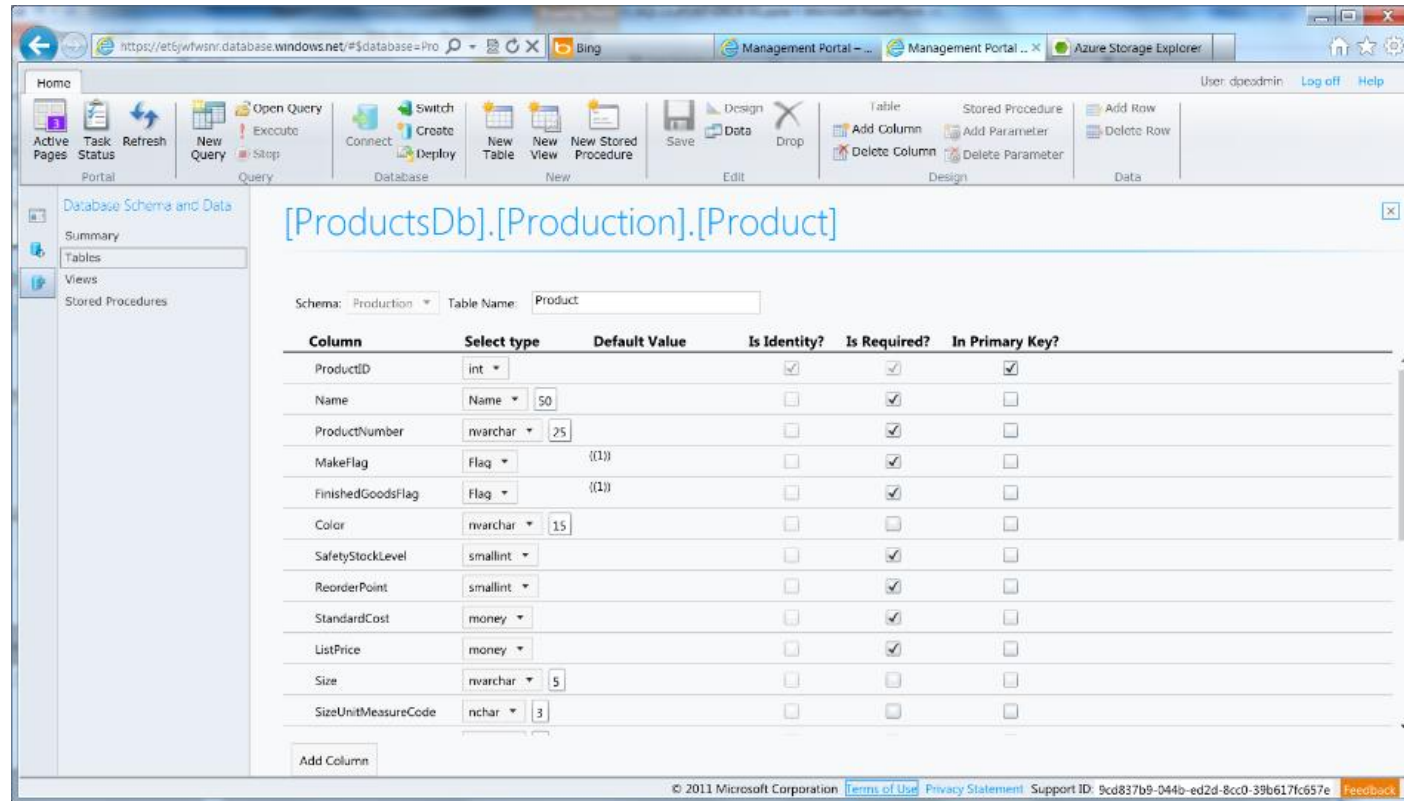
지원하지
않는
SQL Server
기능

- Use 명령, 분산 트랜잭션, 분산 뷰
- Service Broker
- SQL Agent
- SQL Profiler
- Native Encryption



테이블, 뷰, 저장프로시저를 제작하기 위한 웹 디자이너 도구를 이용해 쿼리 수정 및 실행

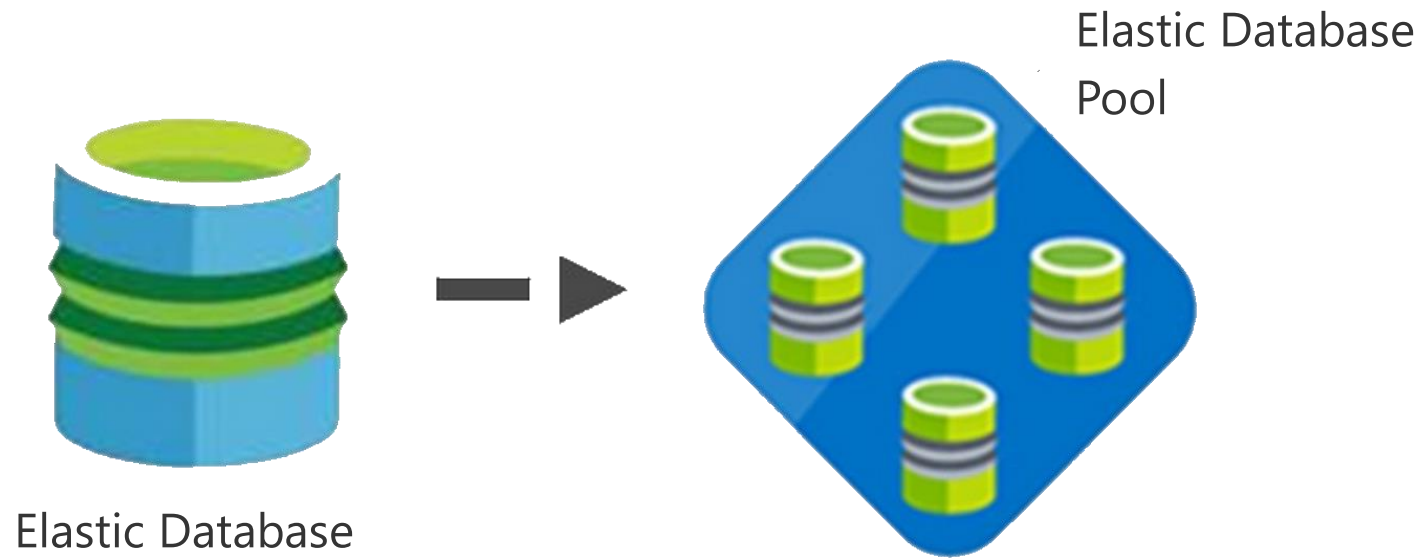
Microsoft



Azure SQL Database Management Portal

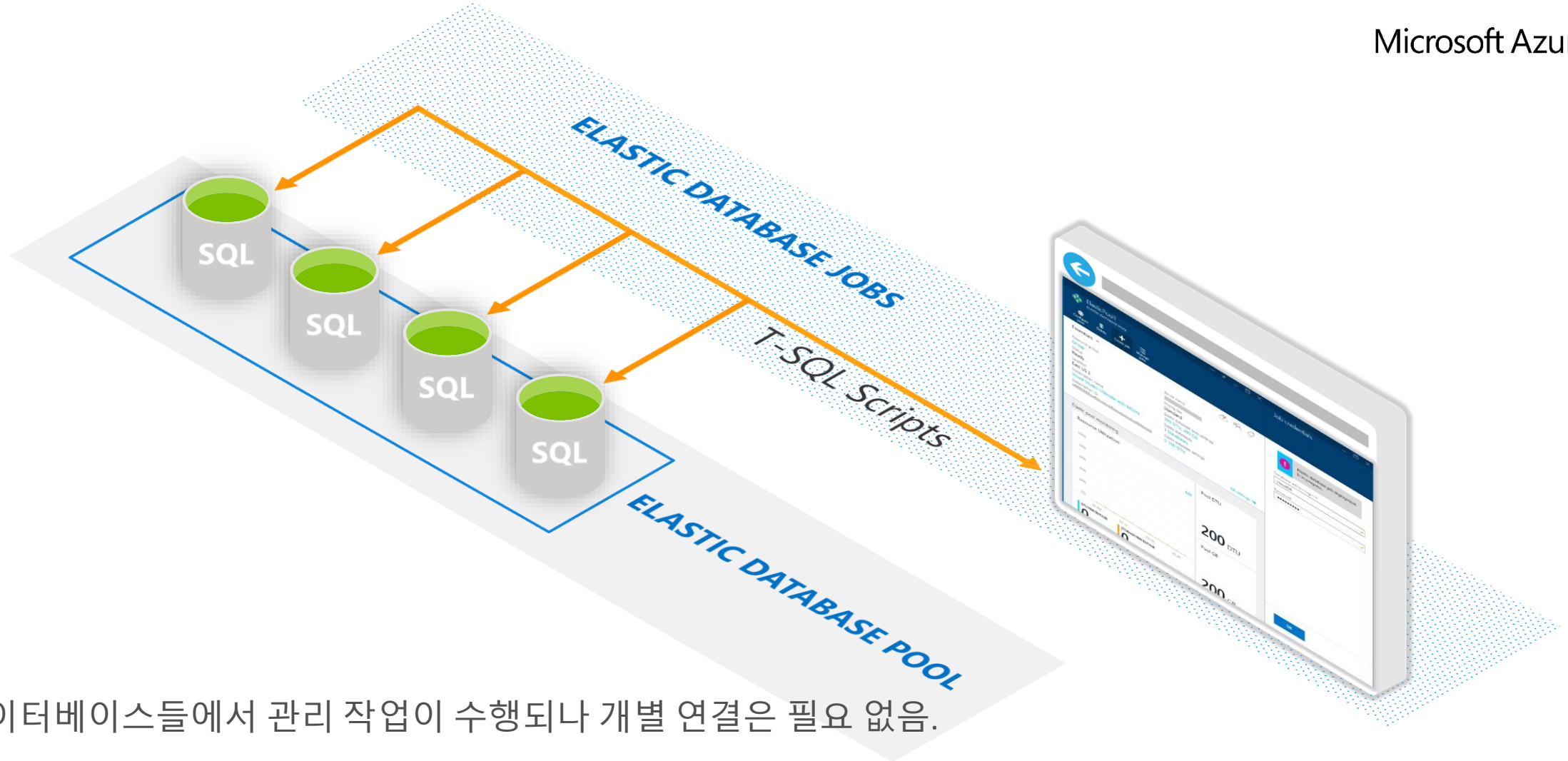
Elastic Database





많은 수의 SQL Database를 배포하기 위한 예측가능한 모델

Elastic Database Pool



개별 데이터베이스들에서 관리 작업이 수행되나 개별 연결은 필요 없음.

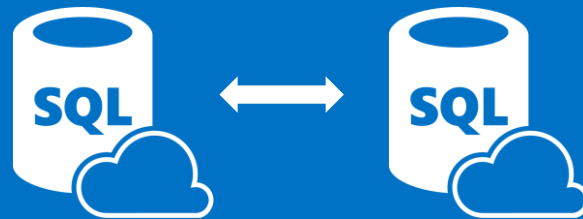
Elastic Database Jobs

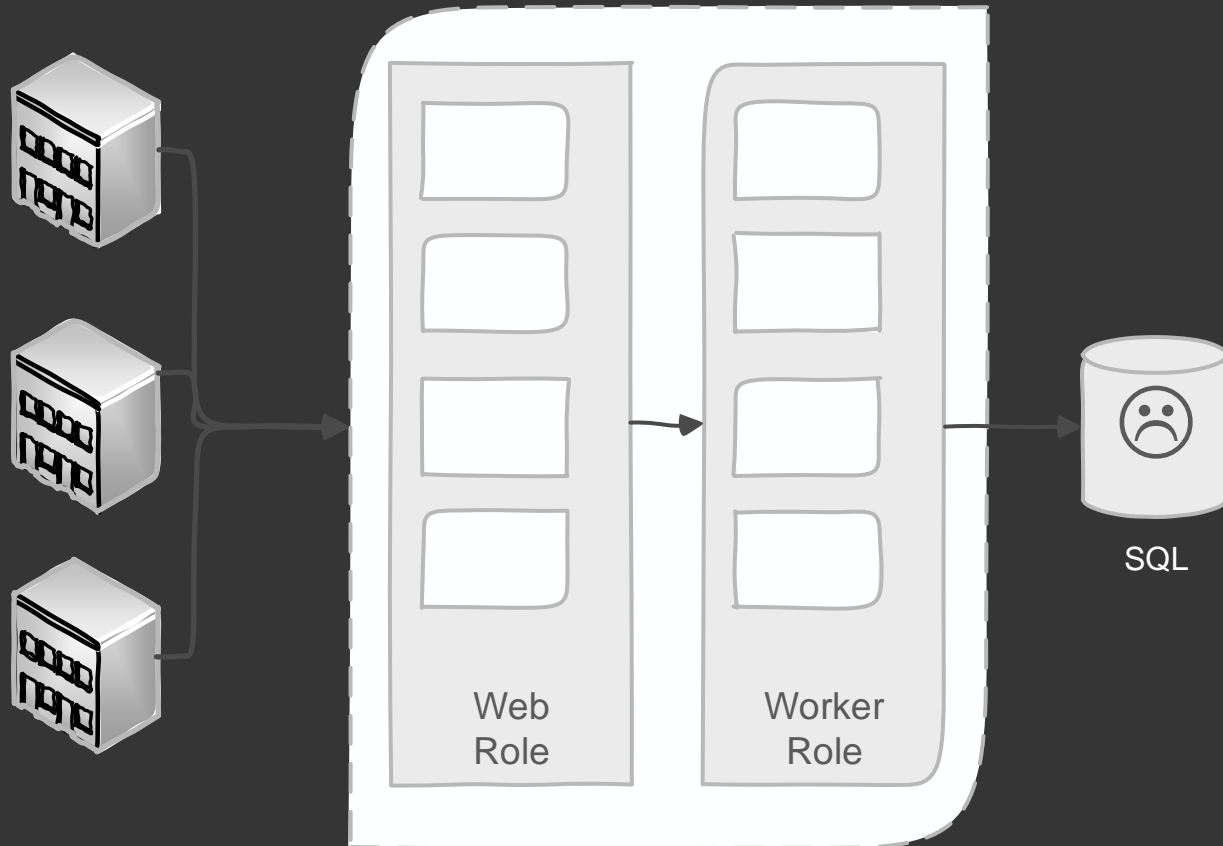
Elastic Database Jobs

- 변경이나 관리 작업이 많은 database에서 적용됨
- 익숙한 T-SQL 구문을 job 생성에 사용
- 자동 재연결 로직 포함
- Azure 포털에서 elastic pool과 함께 사용
- 배치 처리 작업을 위해 디자인

많은 수의 database를 관리

Elastic Scale



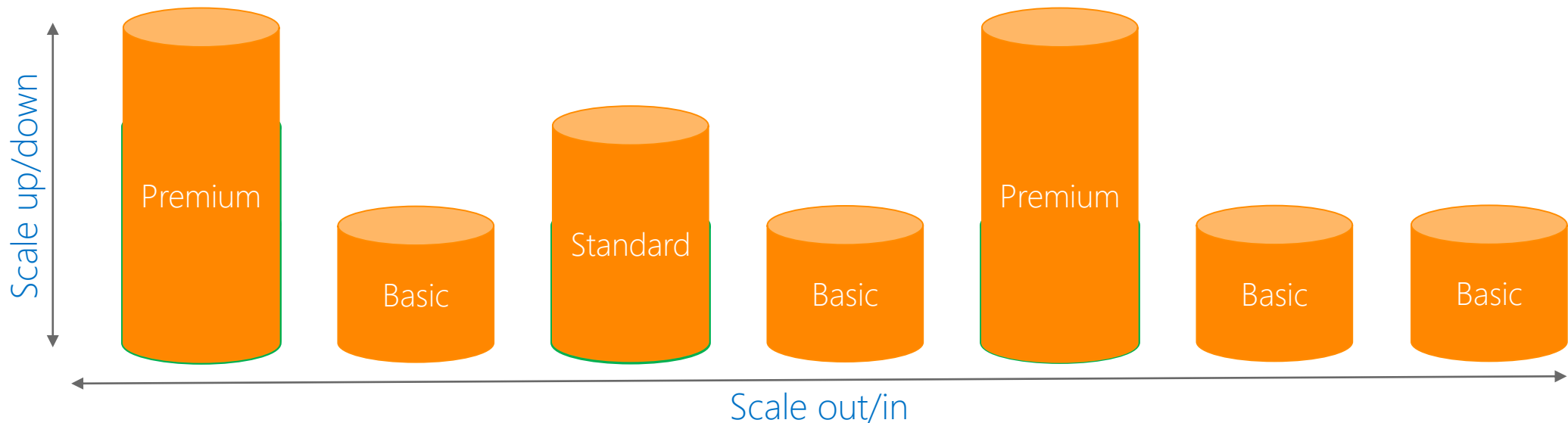


- 전형적인 3-tier 아키텍처
- 프론트엔드의 수평확장은 간단
- 데이터 티어의 확장은 어려움

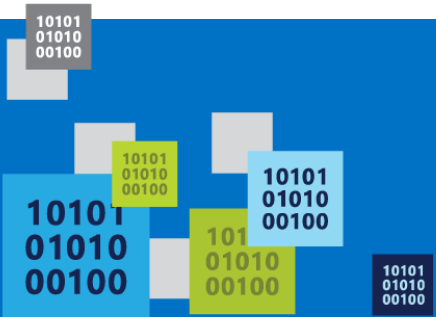
- Elastic Scale - sharding을 통해 수천개의 database까지 확장
- Shard 패턴을 지원하고, .NET client를 활용
- 개발자 기능과 관리 기능을 제공
- 데이터에 대한 split, merge, 및 move 작업 지원

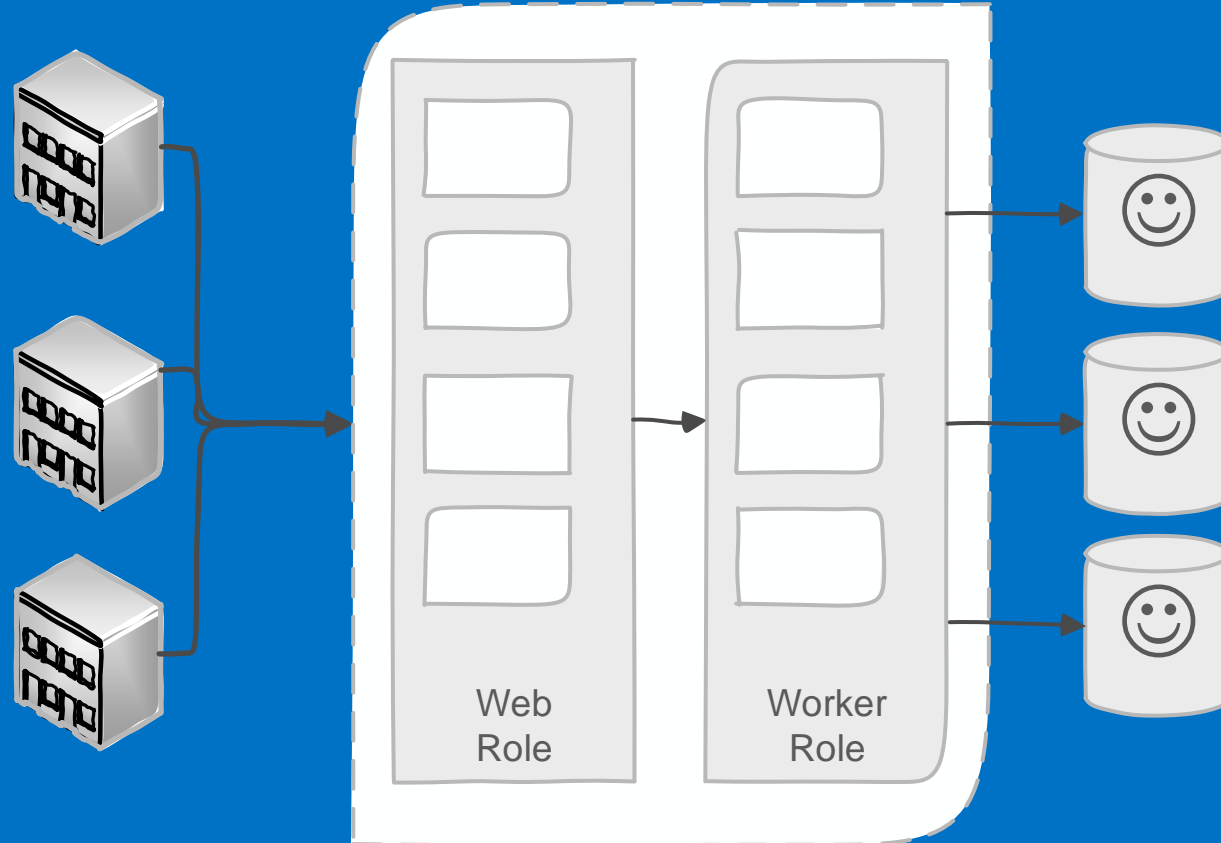
Vertical: Scale-up 또는 scale-down

Horizontal: Scale-out 또는 scale-in



Azure SQL DB의 확장 옵션





SQL Server VM



VM에서 SQL 실행

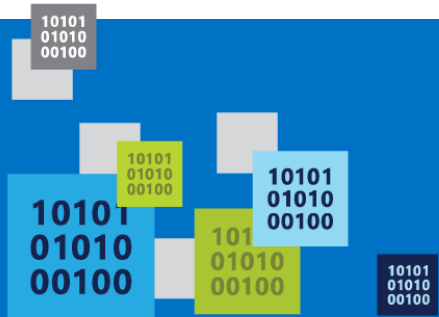
Microsoft Azure

- 클라우드 VM에서 SQL 실행
- SQL Server, Oracle, MySql 등을 지원
- Gallery의 VM 이미지를 이용해 즉시 배포 가능
- VM에 디스크 추가(attach) 가능
- VM과 연계된 여러 SQL 엔진의 기능을 사용 가능

SQL IaaS

SQL Database

두개의 다른 SQL 엔진



SQL Database

SQL IaaS

Microsoft Azure

관리 비용을 줄이고 elastic scale과 같은 기능이 필요할 때

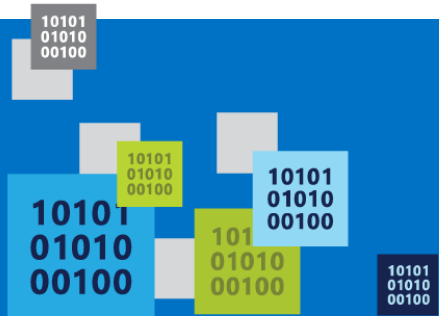
고객이 추가적인 IT 인력을 기술지원이나 유지보수에 쓰고 싶지 않을 경우

SQL VM 전체 기능을 사용하는 어플리케이션일 경우

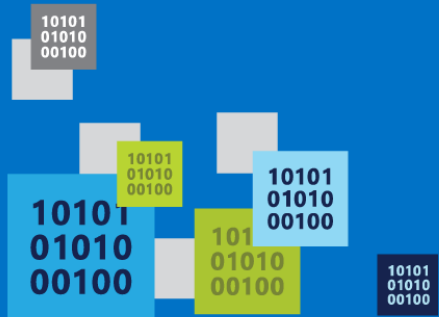
고객사에 기술지원이나 유지보수가 가능한 IT 인력이 있을 경우

SQL IaaS는 지원하나 SQL Database에서 아직 지원하지 않는 기능

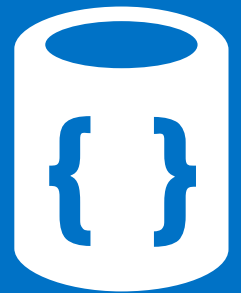
- 전체 SQL Server 기능 (e.g. Reporting Services)
- 원도 인증 (VM은 on-premise의 도메인에 가입 가능)
- 더 큰 데이터베이스 크기 (16TB)



Demo: Standing up a SQL Server in Azure using Marketplace



Cosmos DB



Put your data where your users are



Global distribution

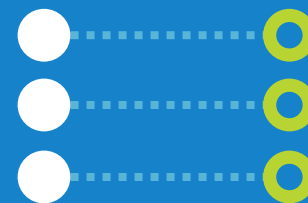
Automatically replicate all your data around the world –
across more regions than Amazon and Google combined



➤ Global distribution

➤ Multi-model + multi API

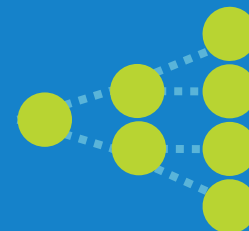
Use key-value, graph, and document with a schema-agnostic service that doesn't require any schema or secondary indexes



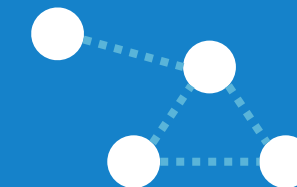
KEY-VALUE



COLUMN-FAMILY



DOCUMENT



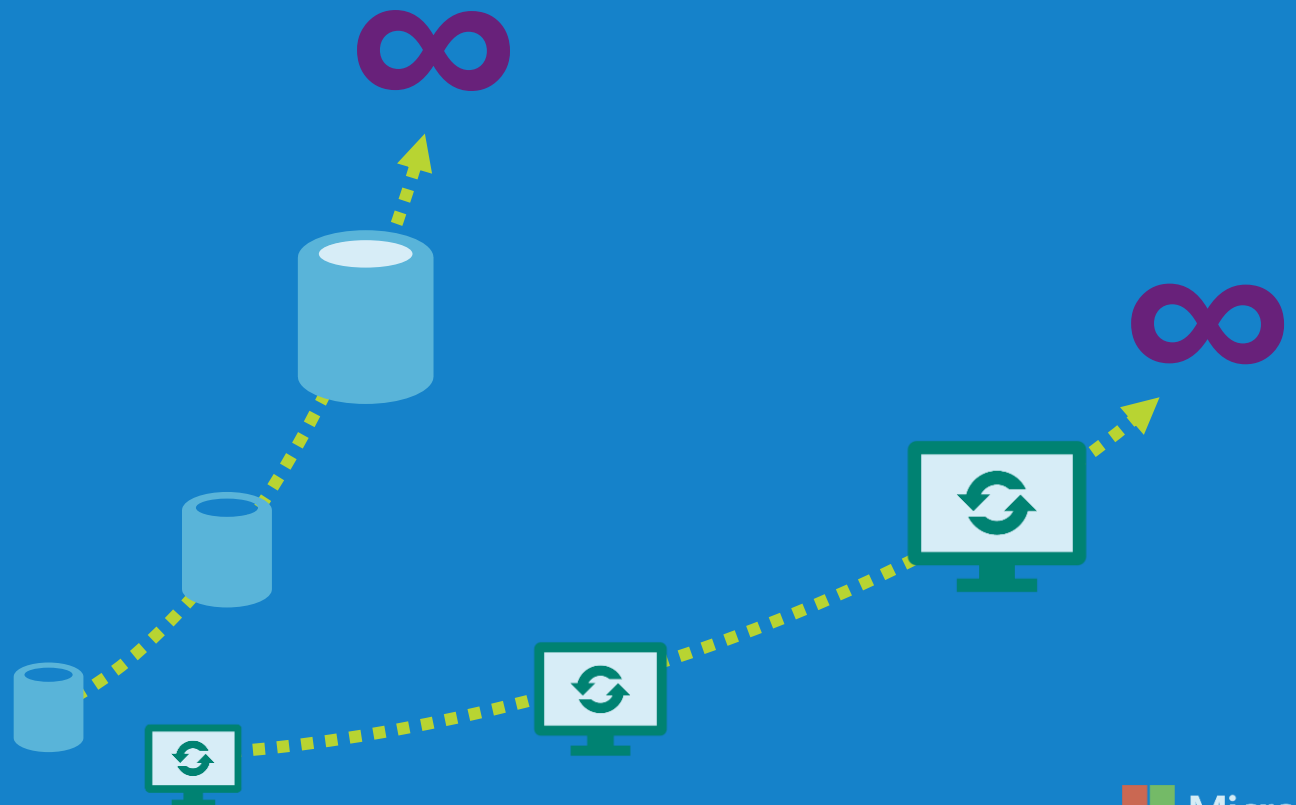
GRAPH

➤ Global distribution

➤ Multi-model + multi API

➤ Elastic scale-out

Independently and elastically scale storage and throughput across regions



➤ Global distribution

➤ Multi-model + multi API

➤ Elastic scale-out

➤ **Choice of consistency**

Choose from five defined consistency levels for low latency and high availability



Strong



Bounded-stateless



Session



Consistent prefix



Eventual



- **Global distribution**
- **Multi-model + multi API**
- **Elastic scale-out**
- **Choice of consistency**
- **Guaranteed single-digit latency**

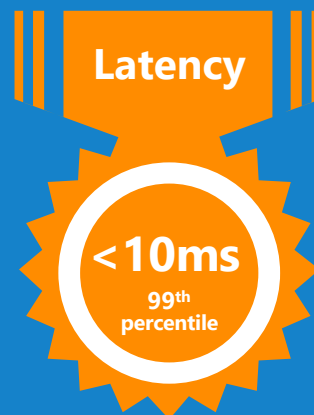
Serve <10 ms read and <15 ms write requests at the 99th percentile from the nearest region while delivering data globally



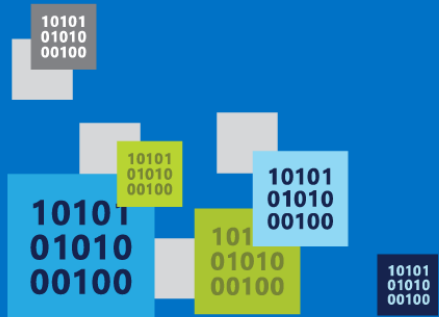
Guaranteed global
millisecond latency
at the 99th percentile

- Global distribution
- Multi-model + multi API
- Elastic scale-out
- Choice of consistency
- Guaranteed single-digit latency
- Enterprise-level SLAs

Only service with financially-backed SLAs for millisecond latency at the 99th percentile, 99.99% HA and guaranteed throughput and consistency



Demo: Interacting with Cosmos DB

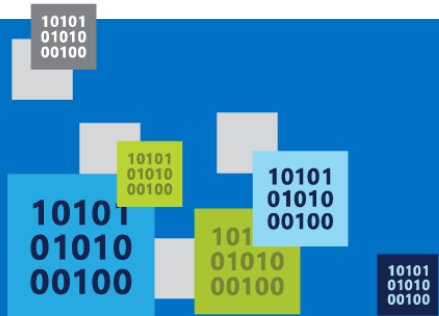


Search



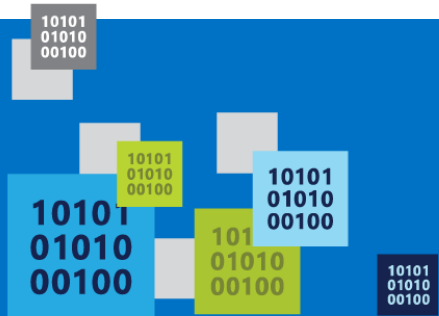
Azure Search

기업의 클라우드 개발자, 클라우드 기반 개발사, 아키텍트 등 관리되는 search 솔루션이 필요할때 최선의 선택



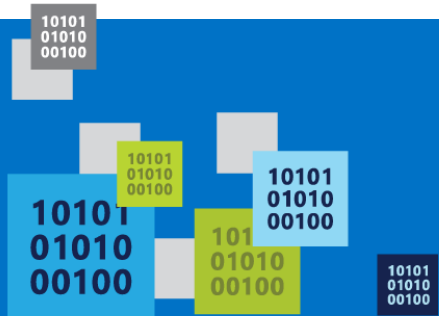
Search Functionality

- 단순한 HTTP/JSON API 로 색인, 문서 업데이트, 검색이 가능
- 사용자 친화적인 키워드 검색 선언자 이용 가능(+, -, *, "", etc.)
- Hit highlighting
- Faceting (histograms over ranges, typically used in catalog browsing)

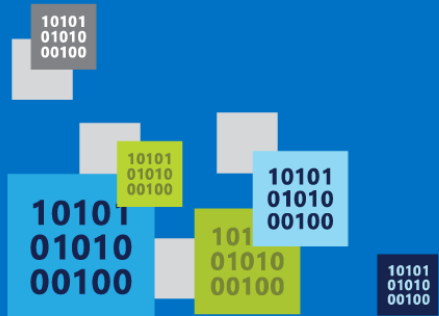


Search Functionality

- Suggestions (자동 컴파일)
- 검색과 조합되는 다양한 구조적 쿼리 (filter, select, sort) 지원
- 모델검색 결과 유사도에 따른 scoring profile
- 필터링, 정렬, 랭킹과 통합된 Geo-spatial 지원



Demo: Azure Search walkthrough



HOME

NOTIFICATIONS

BROWSE

JOURNEYS

BILLING

DEBUG

NEW

Search

Microsoft

Microsoft Azure Search (Preview) is a search-as-a-service solution that allows developers to embed a sophisticated search experience into web and mobile applications without having to worry about the complexities of full-text search and without having to deploy, maintain or manage any infrastructure. With Azure Search you can surface the power of searching data in your application, reduce the complexity around managing and tuning a search index, and boost development speed using familiar tools and a consistent platform.

Azure Search Features:

- Powerful, reliable performance
- Connect business goals to the application
- Scale out easily
- Sophisticated search functionality
- Fast time to market
- Simplify search index management

Swinging Superman

Running

Browse Search Services

Freezing Top Group

My Search

Summary

Monitoring

Document Count today

Storage Size today

1,234

40.09 MB

PUBLISHER

Microsoft

USEFUL LINKS

[Microsoft Azure Search pricing](#)
[Tutorials and guides](#)
[Forum](#)
[Managing your search service with Microsoft Azure Preview features](#)

Create

New Search Service

URL

trailsapp

.search-current.windows-int.net

PRICING TIER

Standard

RESOURCE GROUP

Configure required settings

SUBSCRIPTION

Configure required settings

LOCATION

Configure required settings

i

Creating a standard service takes 10 or more minutes.

☒ Add to Startboard

Create

Choose your pricing tier

BROWSE THE AVAILABLE PLANS AND THEIR FEATURES

Please choose a pricing tier for your search service. [Learn more](#)

S	STANDARD	F	FREE
15M	Up to 15,000,000 documents	10K	Up to 10,000 documents
50	Up to 50 indexes	3	Up to 3 indexes
	Storage Up to 300 GB		Storage Up to 50 MB
	Scaling Up to 36 search units		Scaling None
	Resources Dedicated		Resources Shared
125.00		0.00	
USD/MONTH PER UNIT (PREVIEW PRICING)		USD/MONTH PER UNIT	

Select

HOME

NOTIFICATIONS

BROWSE

JOURNEYS

BILLING

DEBUG

NEW

that allows developers to embed a sophisticated
ions without having to worry about the complexities
, maintain or manage any infrastructure. With Azure
data in your application, reduce the complexity
d boost development speed using familiar tools and

My Search

STOP

DELETE

Summary

Group

mysearch

Index

SEARCH ENGINE

PROPERTIES

KEYS

Monitoring

Document Count today

Storage Size today



1000

1000

1000


1000

New search service

URL 
trailsapp 
.search-current.windows-int.net

PRICING TIER
standard >

RESOURCE GROUP
searchtestgroup2 >


SUBSCRIPTION
Ibiza Subscription 1 


LOCATION
Configure required settings >

☒ Add to Startboard

Create

Location





East Asia 

Southeast Asia

East US

West US

North Central US 

South Central US 

North Europe

HOME

1NOTIFICATIONS

BROWSE

JOURNEYS

BILLING

DEBUG

NEW

Unidentified User

CREDIT LEFT
100.00 USD

SUBSCRIPTIONS
7

Feedback

AZURE PORTAL

Tour

Welcome to Azure

Quick start

What's new

Search Service

trailsapp
SEARCH SERVICE

running

RUNNING

trailsapp

SEARCH SERVICE

START

STOP

DELETE

Summary

searchtestgroup2

trailsapp

Search service

Search services

2 instances

Quick start

PROPERTIES

KEYS

Usage

Scale	
Replicas	1
Partitions	1
Search units	1

Index

Indexes

2

RUNNING

Scale

TRAILSAPP

SAVE

DISCARD

REPLICAS

3

PARTITIONS

4

TOTAL SEARCH UNITS

12

HOME

1 NOTIFICATIONS

BROWSE

JOURNEYS

BILLING

DEBUG

NEW

RUNNING

trailsapp

SEARCH SERVICE

START

STOP

DELETE

Summary

searchtestgroup2

trailsapp

Search service

Search services

2 instances

Quick start

PROPERTIES

KEYS

Usage

Scale

Replicas1

Partitions1

Search units1

Index

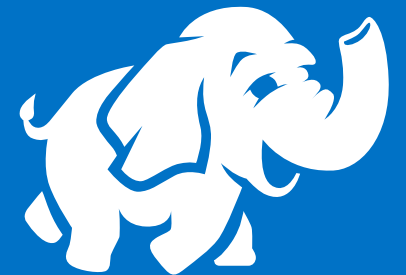
Indexes

Indexes

TRAILSAPP

NAME	DOCUMENT COUNT	STORAGE SIZE (BYTES)
indexa	1000	1234
indexb	2000	4312

HDInsight



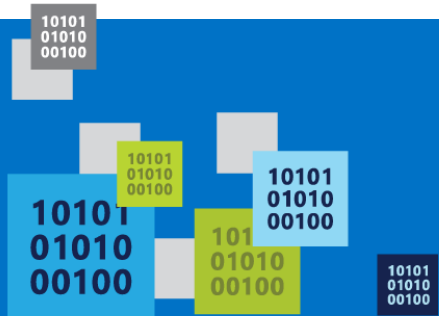


Data size	Gigabytes (<i>Terabytes</i>)	Petabytes (<i>Hexabytes</i>)
Access	Interactive and Batch	Batch
Updates	Read / Write 다수 실행	Writ는 한번, Read 다수 실행
Structure	정적 스키마	동적 스키마
Integrity	High (ACID)	Low
Scaling	비선형(Nonlinear)	선형(Linear)

Reference: Tom White's Hadoop: The Definitive Guide

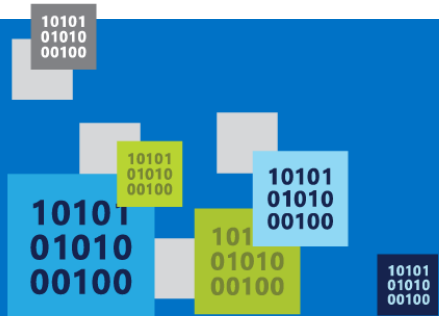
HDInsight
개발 – 기존
개발 생태계
활용

Hive
Pig
Mahout
Cascading
Scalding
Scoobi
Pegasus
...



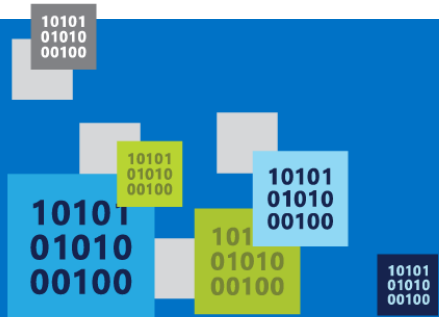
HDInsight
개발 –
Microsoft .NET

C#
F#
Map/Reduce
Microsoft .NET management clients

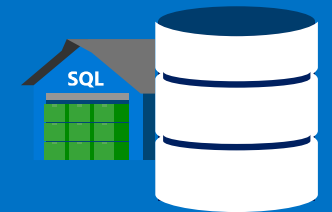


HDInsight
개발 –
DevOps / IT
Pros

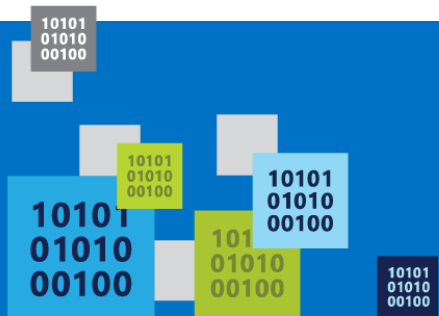
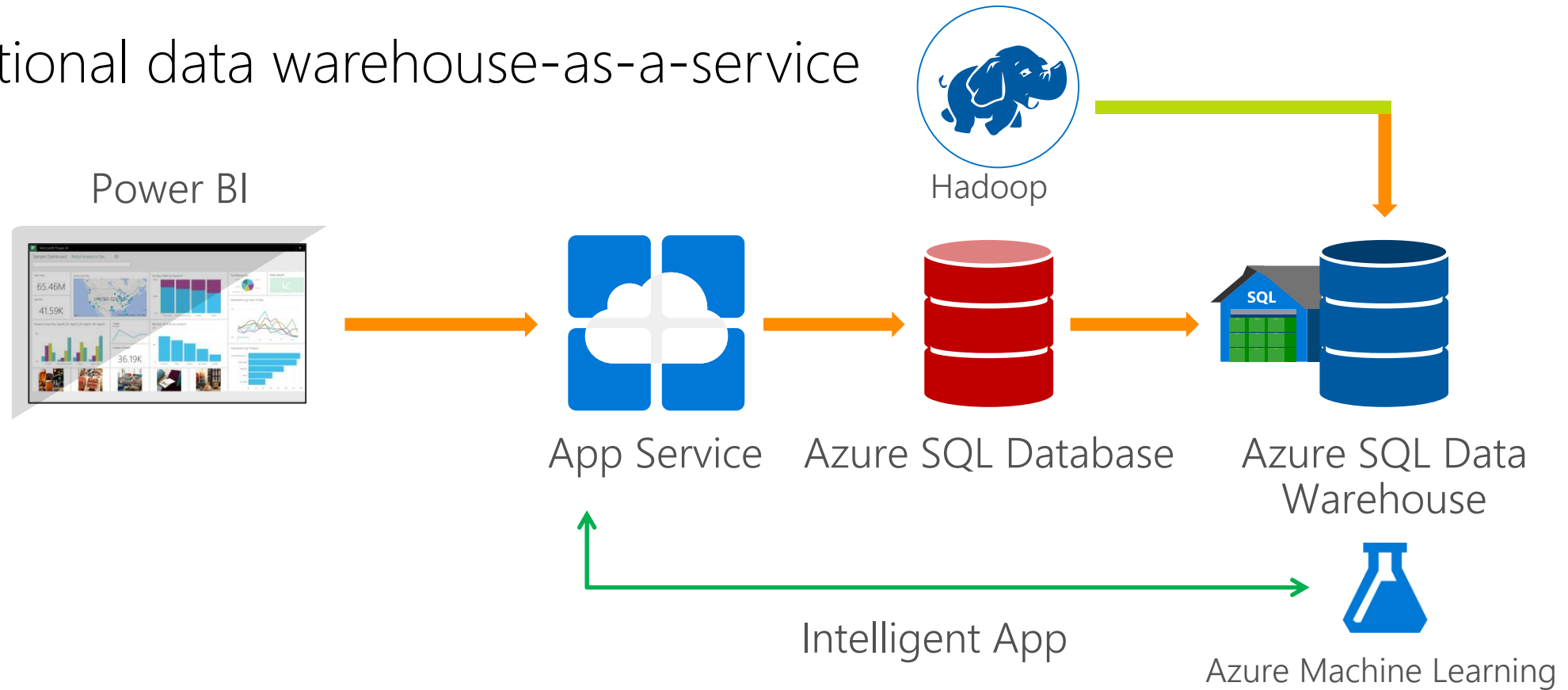
PowerShell
Cross-Platform CLI tools (xplat-cli)



Data Warehousing



A relational data warehouse-as-a-service



Elastic scale & 성능

Petabyte의 데이터까지 확장
대규모 병렬처리
수초 내에 즉시 컴퓨팅 확장
관계형 및 비정형 쿼리

Powered by the Cloud

수분내에 실행
Azure ML PowerBI & ADF와
통합
기업환경 지원

저렴한 비용 및 성능

컴퓨팅 및 저장소에 대한
단순 과금 정책
사용한 만큼만 지불, 필요할
경우 dynamic pause 사용
재개발이나 수정 없이 DW를
클라우드에서 활용



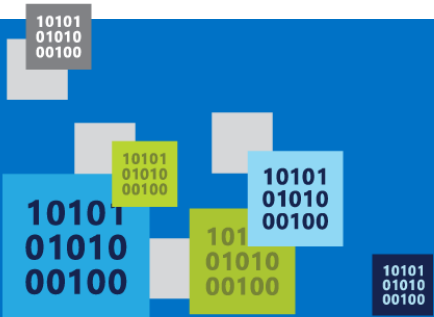
Data Lake



Azure Data Lake 서비스

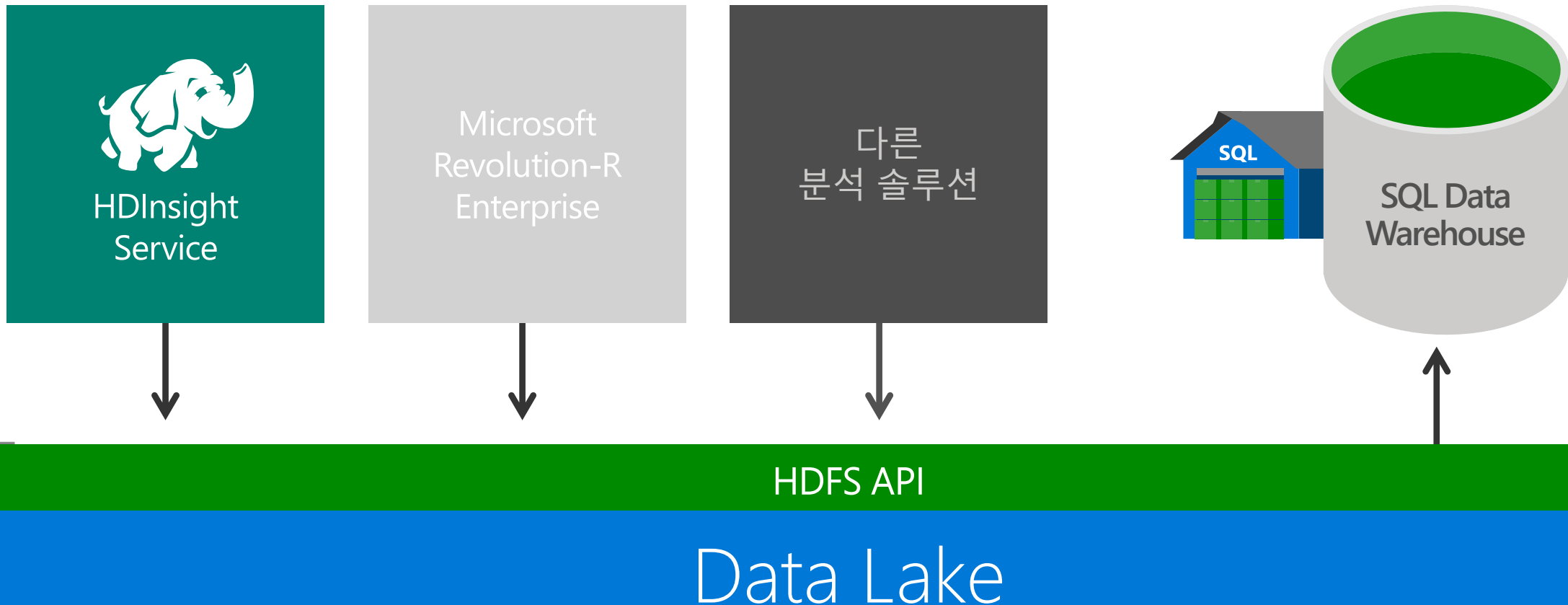


- 대량의 데이터를 저장하고 관리
- 최초 형식(original format)으로 데이터 보관
- 대량 데이터 및 빠른 응답이 필요한 분석 작업에 적합
- 엔터프라이즈급 보안 및 접근 제어



Data Lake 서비스

대량 데이터를 변환 가능하도록 저장



MongoDB, MySQL, Oracle,
Cassandra, Neo4j and more

Azure에서 추가적인 데이터베이스 선택

- Azure Table 서비스는 “Big Table” entity 저장소
- MongoDB는 JSON document 저장소
- Cassandra 복제 기능을 제공하는 column store 기반 저장소
- Hbase는 HDInsight에서 사용 가능한 Big Data (Hadoop) 저장소
- Azure에서 Oracle VM 공식지원
- MySQL은 ClearDB 파트너를 통해 제공

SQL Database

SQL on IaaS

DocumentDB

Search

HDInsight

MongoDB, MySQL,
Oracle, Cassandra,
Neo4j and more





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