

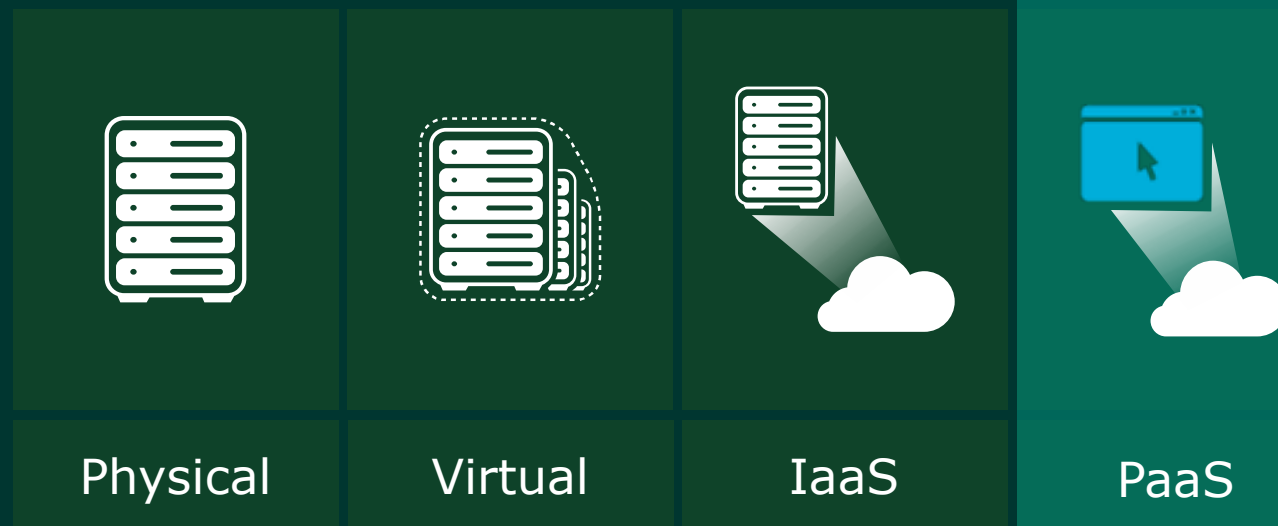
Azure Data Overview



SQL Database



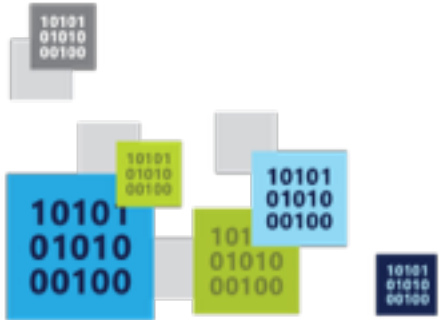
A Continuous offering



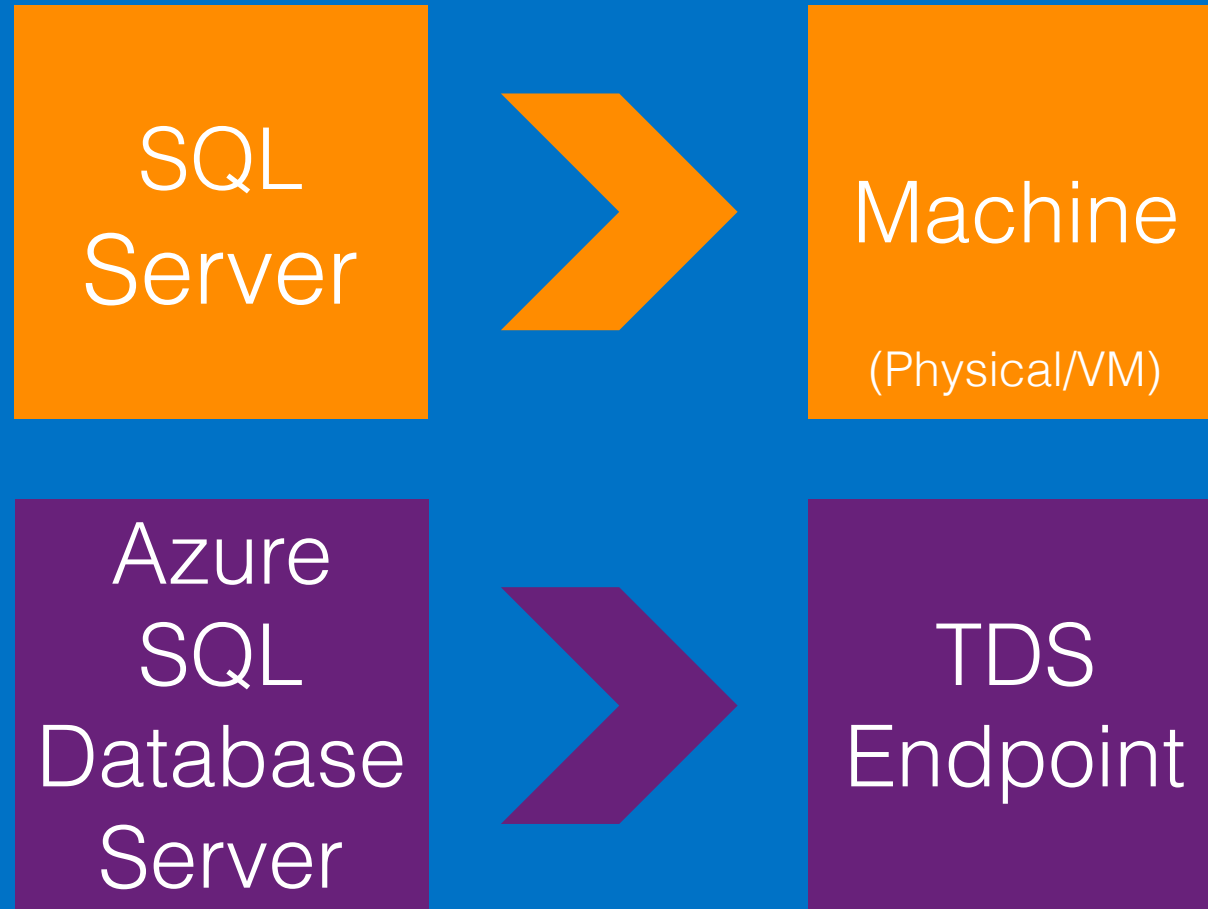
From private to public
Cloud

Architecture

Starting with the basics



A Server is not a machine



SQL Database The Basics

- SQL Server database technology “as a Service”
- Fully Managed
- Enterprise-ready with automatic support for HA, DR, Backups, replication and more



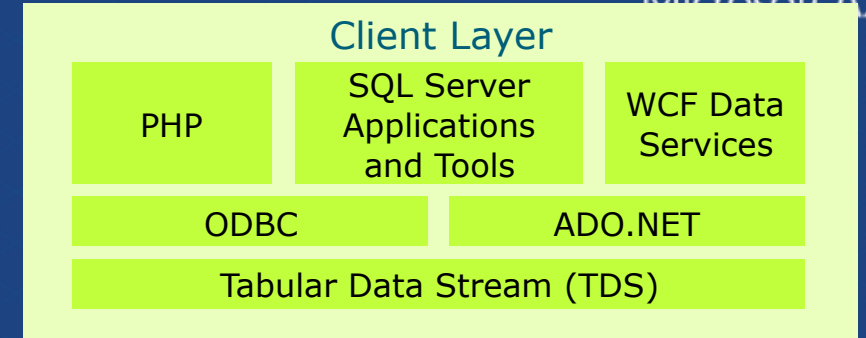
SQL Database The Basics

- Scale out with ElasticScale
- Built-in regional database replicas for additional protection
- Uptime SLA of 99.99%



How It Works – Architecture of the Service

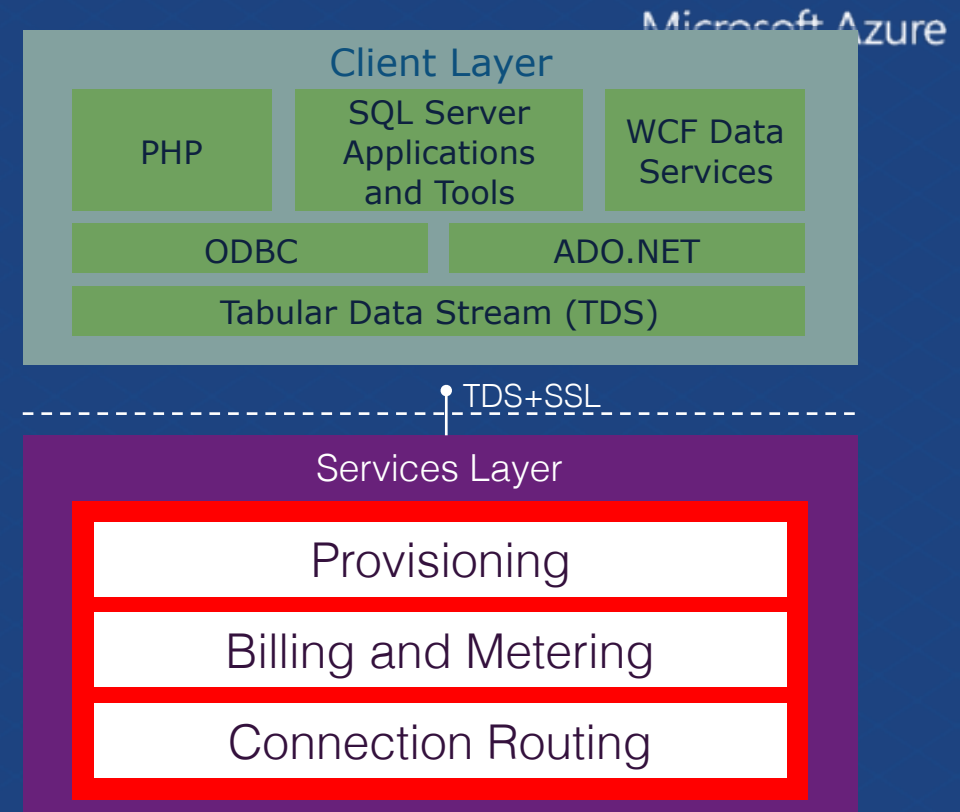
Applications communicate directly with SQL Database using TDS.



Microsoft Azure

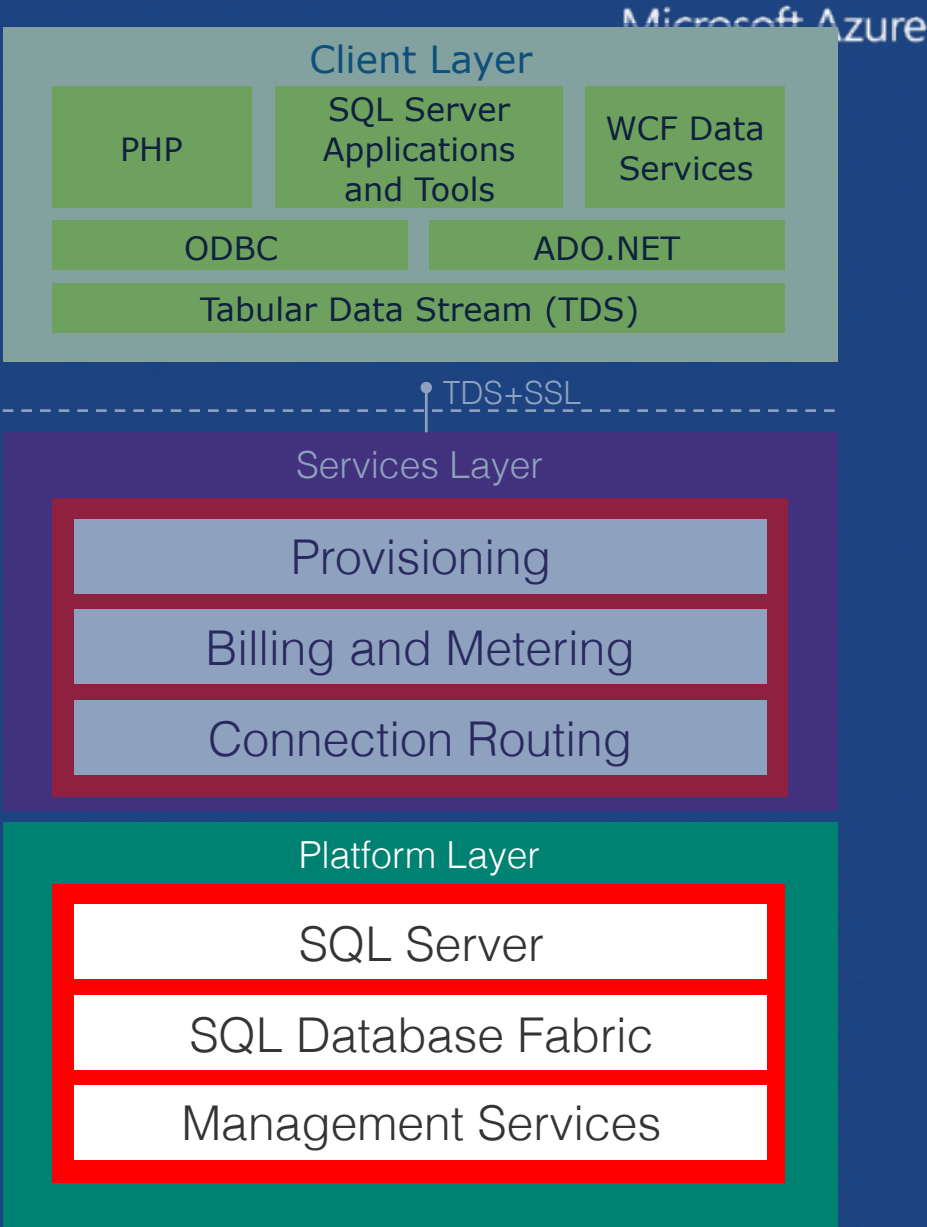
How It Works – Architecture of the Service

Gateway between Client layer
and Platform layer.



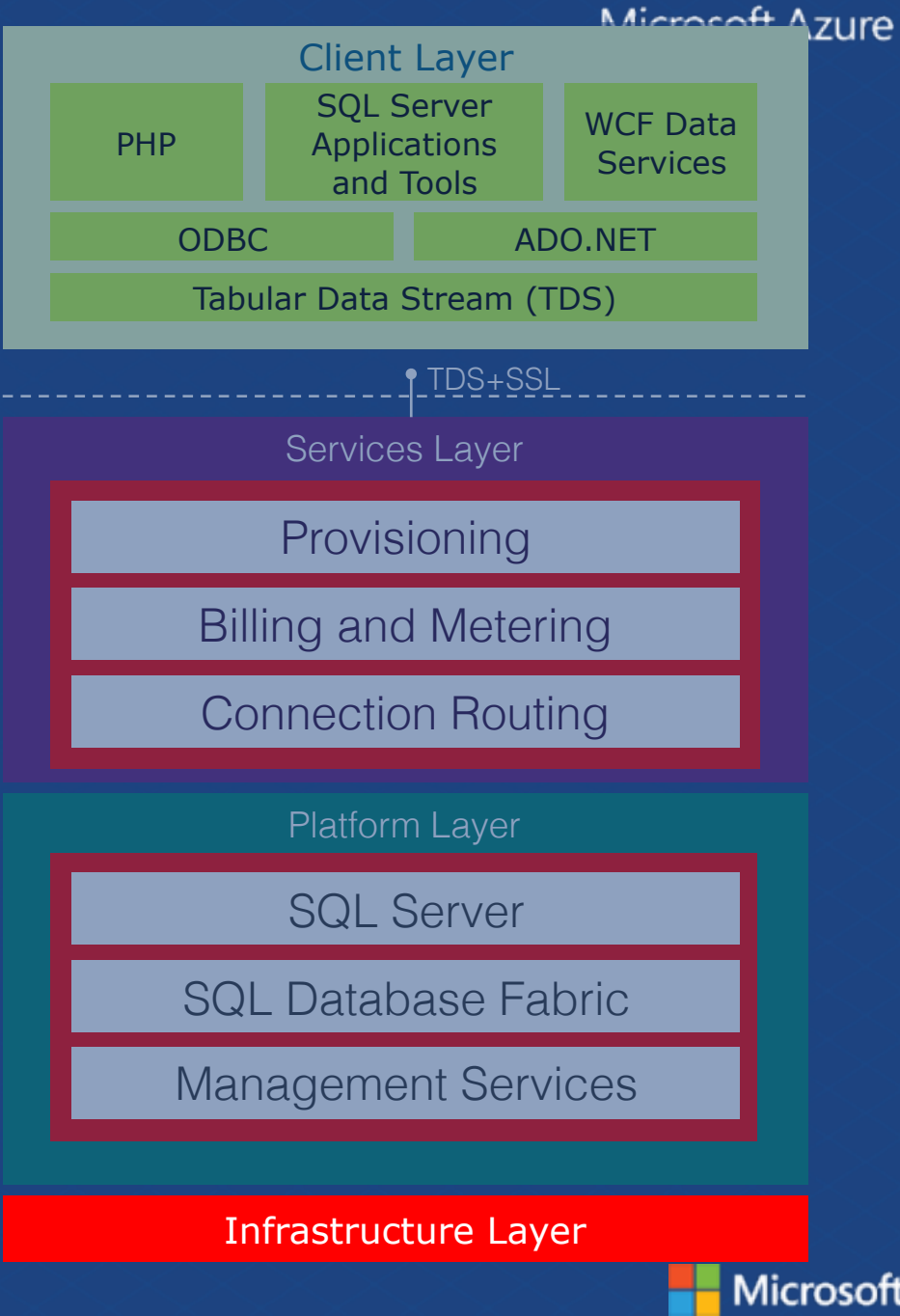
How It Works – Architecture of the Service

Includes physical servicers and services that support the Services layer.



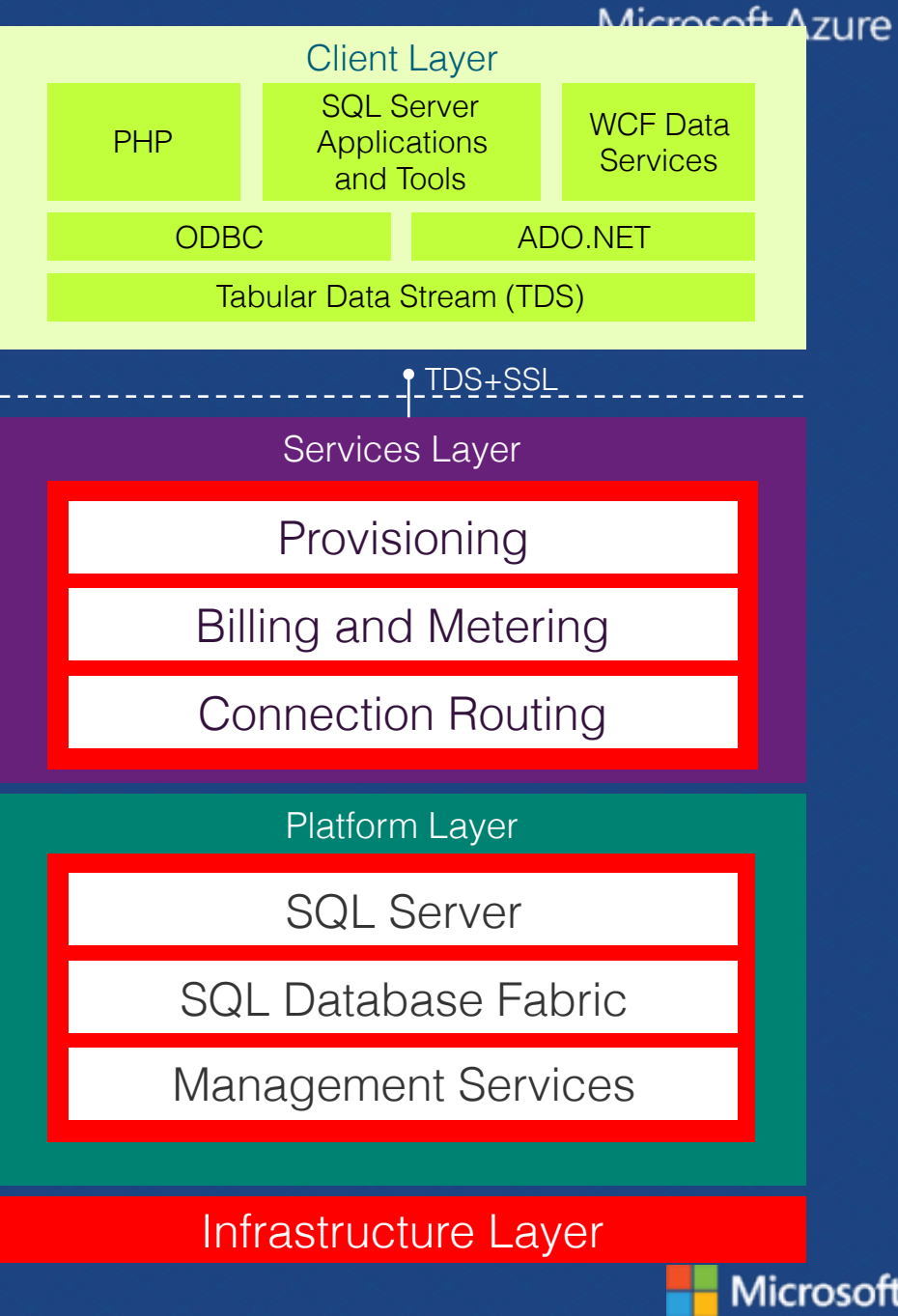
How It Works – Architecture of the Service

Administration of the physical
HW and OS.



How It Works – Architecture of the Service

Microsoft Azure SQL Database PaaS



SQL Database Server

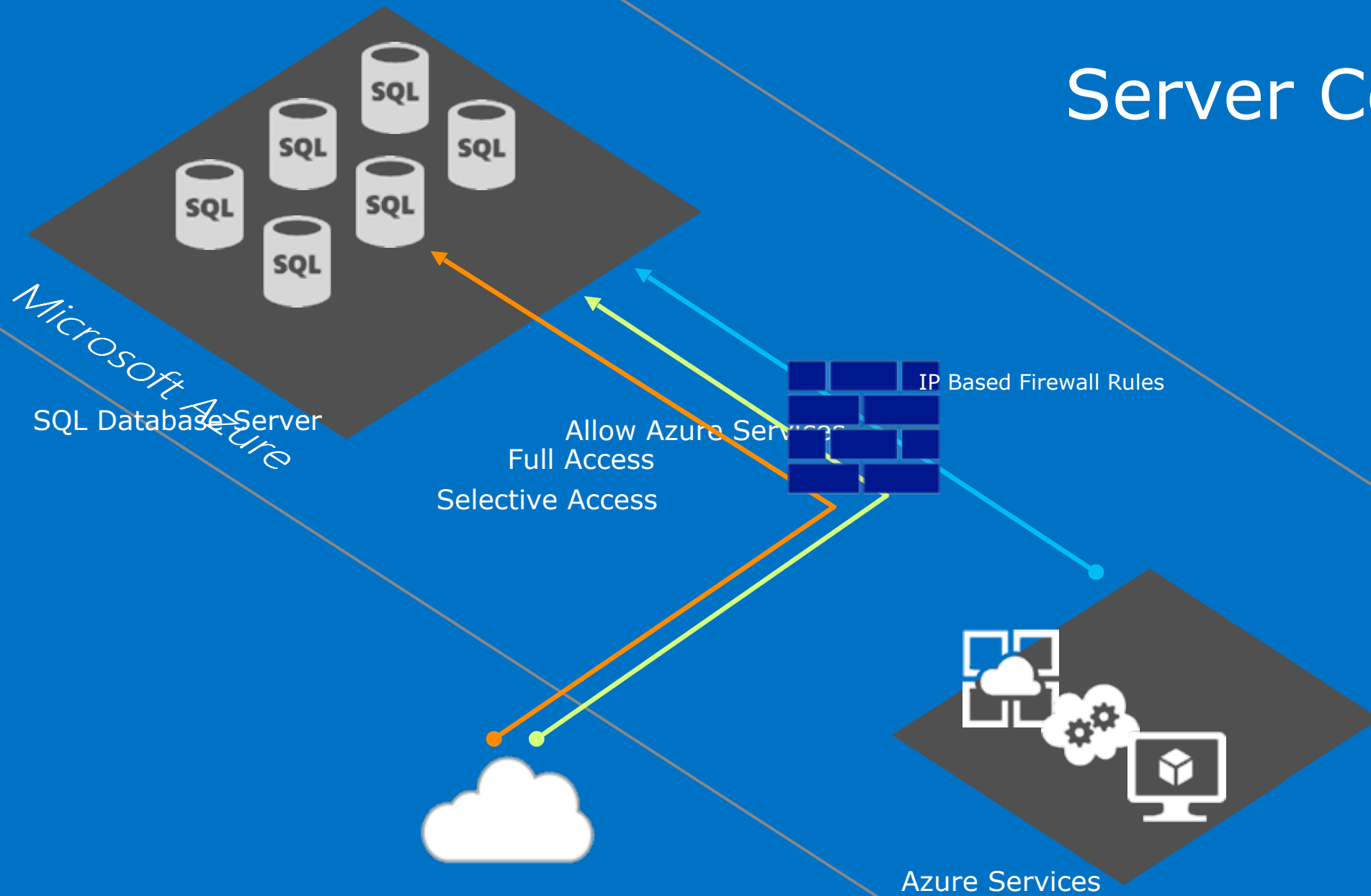
The Service head contains
databases

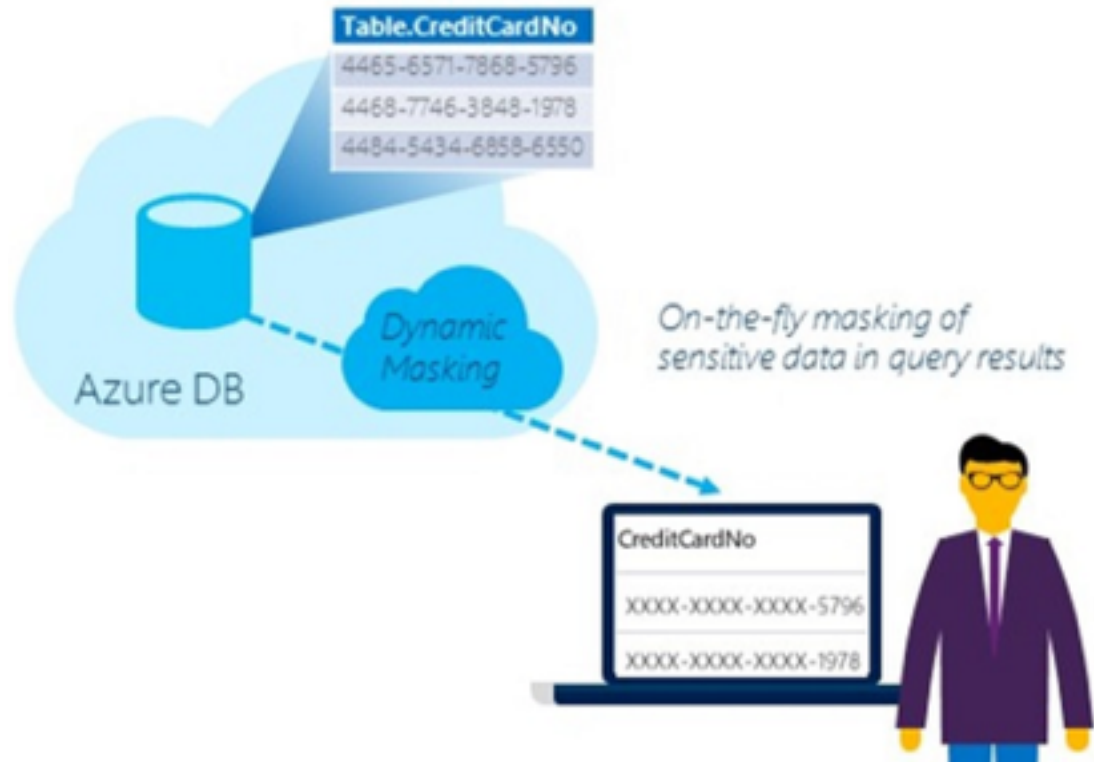
Connect via automatically generated
FQDN:

{name}.database.windows.net

Initially contains only a master
database

Server Connectivity





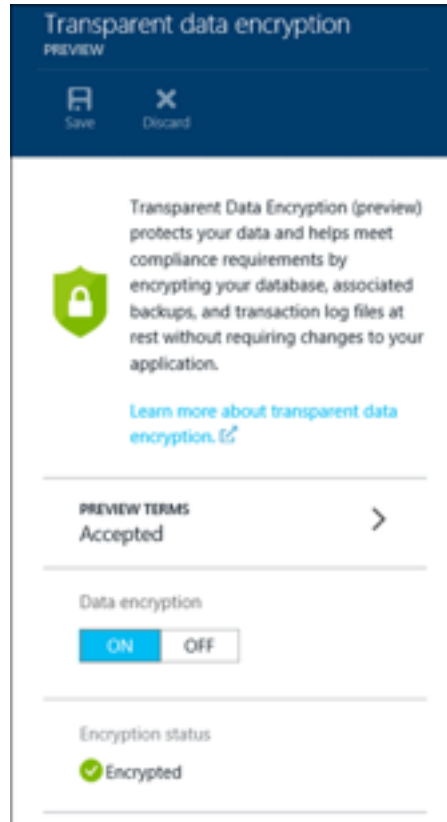
- Limits sensitive data exposure
- Prevents unauthorized access to data
- Policy-based security – no changes to data or application
- Meet regulatory compliance
- Dev/Test production data without compromising data

Protect Sensitive Data

Limit Exposure of Sensitive Data

Transparent Data Encryption (TDE)

Microsoft Azure



- Encrypted database, backups, and transaction log at rest
- 2-click provisioning
- Reduced attack surface area
- No code changes to existing applications
- Database encryption key - AES-256
- Meet regulatory compliance
- Accelerated hardware encryption

Encrypt and Protect Database

- Fine-grained access over rows
- Access restrictions logic contained in database
- Simplified design and coding of security
- Meet regulatory compliance
- Reduced surface area of your security system

A decorative graphic in the bottom-left corner consisting of several overlapping squares of different colors (blue, yellow, green, grey). Each square contains a 3x3 grid of binary digits (0s and 1s).

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 3x3 grid of binary digits (0s and 1s).

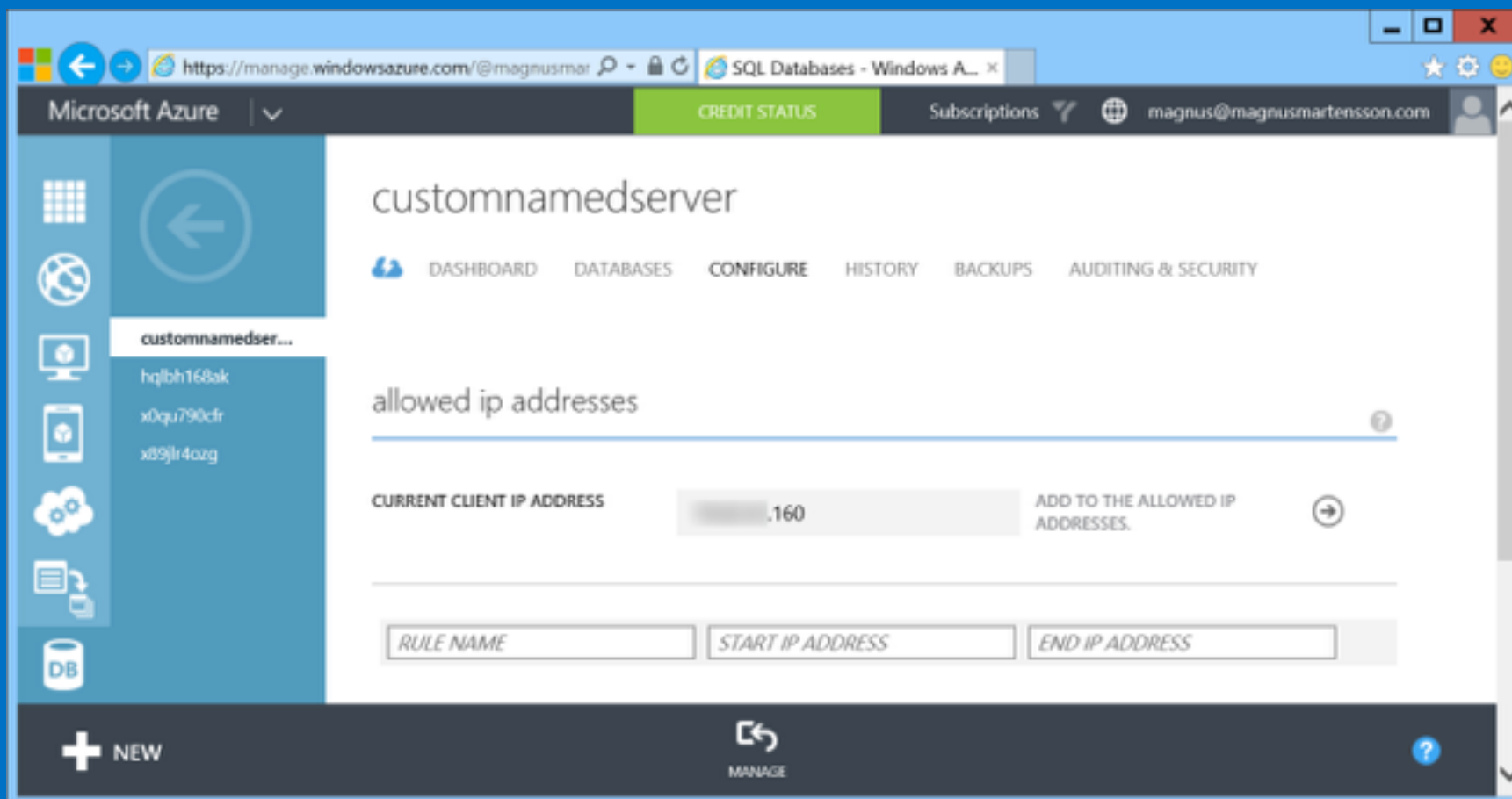
Fine-grained Access Over Rows

In the Preview Management Portal create a SQL Database server

The screenshot shows a web browser window with the URL `https://portal.azure.com/#` and the title 'Microsoft Azure'. The browser window displays a 'Server' management interface. On the left, there is a sidebar with icons for 'Server', '1', a search icon, a document icon, and a clock icon. The main content area is divided into two panels. The left panel, titled 'Server', contains the text 'The list below contains servers compatible with your selected database or source. [Learn more](#)' and a large blue button labeled 'Create a new server' with a right-pointing chevron. Below this button 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' with a green checkmark to its right. Below the input field is the text '.database.windows.net'. At the bottom of the right panel is a blue 'OK' button.

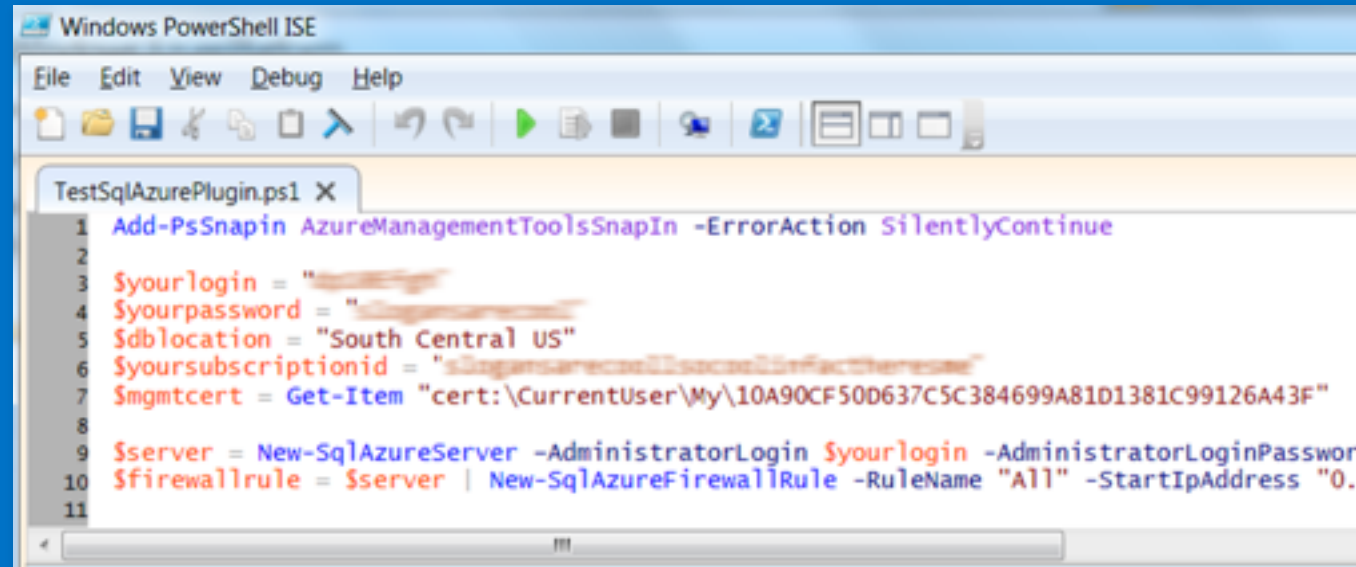
Provision Servers Interactively

In the Management Portal add firewall rules



Automate Server Provisioning

Microsoft Azure Platform PowerShell cmdlets



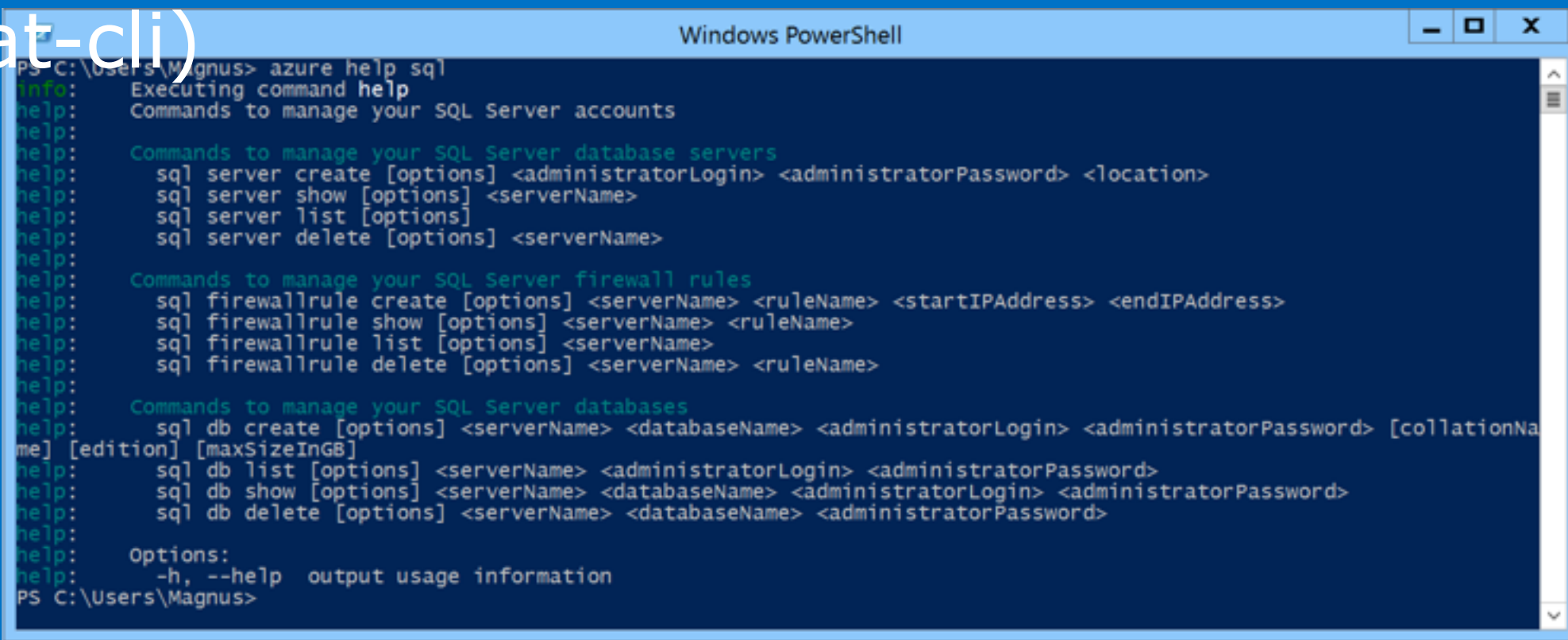
The screenshot shows the Windows PowerShell ISE interface with a script named 'TestSqlAzurePlugin.ps1'. The script contains the following commands:

```
1 Add-PSnapin 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 -DatabaseLocation $dblocation -SubscriptionId $yoursubscriptionid
10 $firewallrule = $server | New-SqlAzureFirewallRule -RuleName "All" -StartIpAddress "0.0.0.0"
11
```

<http://bit.ly/azurepowershell>

Automate Server Provisioning

Azure Cross-Platform Command-Line Interface (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>

Selecting the right SQL Database edition

Microsoft Azure

| 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 |

This information is subject to change over time.

- Auto backups, transactional logs every 5 min
- Backups in Azure Storage and geo-replicated
- Creates a side-by-side copy, non-disruptive
- Backups retention policy: 7, 14 or 35 days
- Automated export of logical backups for long-term backup protection

- Available in all tiers: Basic, Standard and Premium
- Built on geo-redundant Azure Storage
- Recover to any Azure region

- Opt-in for Standard & Premium databases
- Creates a stand-by secondary
- Replicate to pre-paired Azure region
- Automatic data replication, asynchronous
- Opt-in via REST API, PowerShell or Azure Portal
- Microsoft-managed, RTO<24h, RPO<1 hr

- Self-service activation in Premium
- Create up to 4 readable secondaries
- Replicate to any Azure region
- Automatic data replication, asynchronous
- REST API, PowerShell or Azure Portal
- $RTO < 1h$, $RPO < 5m$, you choose when to failover

- Configurable to track & log database activity
- Dashboard views in the portal for at-a-glance insights
- Pre-defined Power View reports for deep visual analysis on Audit log data
- Audit logs reside in your Azure Storage account
- Available in Basic, Standard, and Premium

- Fast and flexible indexing of textual data
- Data types: char, varchar, nchar, nvarchar, text, ntext, image, xml, varbinary(max), or FILESTREAM
- Handles high query volume
- Common use cases:
 - Searching websites, product catalogs, news items and more
 - Document management systems
 - Any applications that need to provide search capabilities over data stored in a SQL Database

- XML Indexes - improves XQuery-based query performance
- Primary XML Index - speed up access to elements and attributes
 - `CREATE PRIMARY XML INDEX XML_Order_Items`
 - `ON Sales.Order (Items);`
- Secondary XML Index – help resolve specific XQuery expressions rapidly

- Monitor common database, execution and transaction related events in near-real time
- Diagnose blocked or long-running queries, resource bottlenecks, poor query plans, and more
- Help improve capacity planning
- Use familiar T-SQL language

Use Familiar Technologies

Transact-SQL

(obviously)



Use Familiar Technologies - Languages

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

C / C++: ODBC

Java: Microsoft JDBC provider

PHP: Microsoft PHP provider



Use Familiar Technologies - Frameworks

OData

Entity Framework

WCF Data Services

NHibernate (etc.)



Use Familiar Technologies - Tools

SQL Server Management Studio (≥ 2008 R2)

SQL Server command-line utilities (SQLCMD, BCP)

Visual Studio IDE for database development



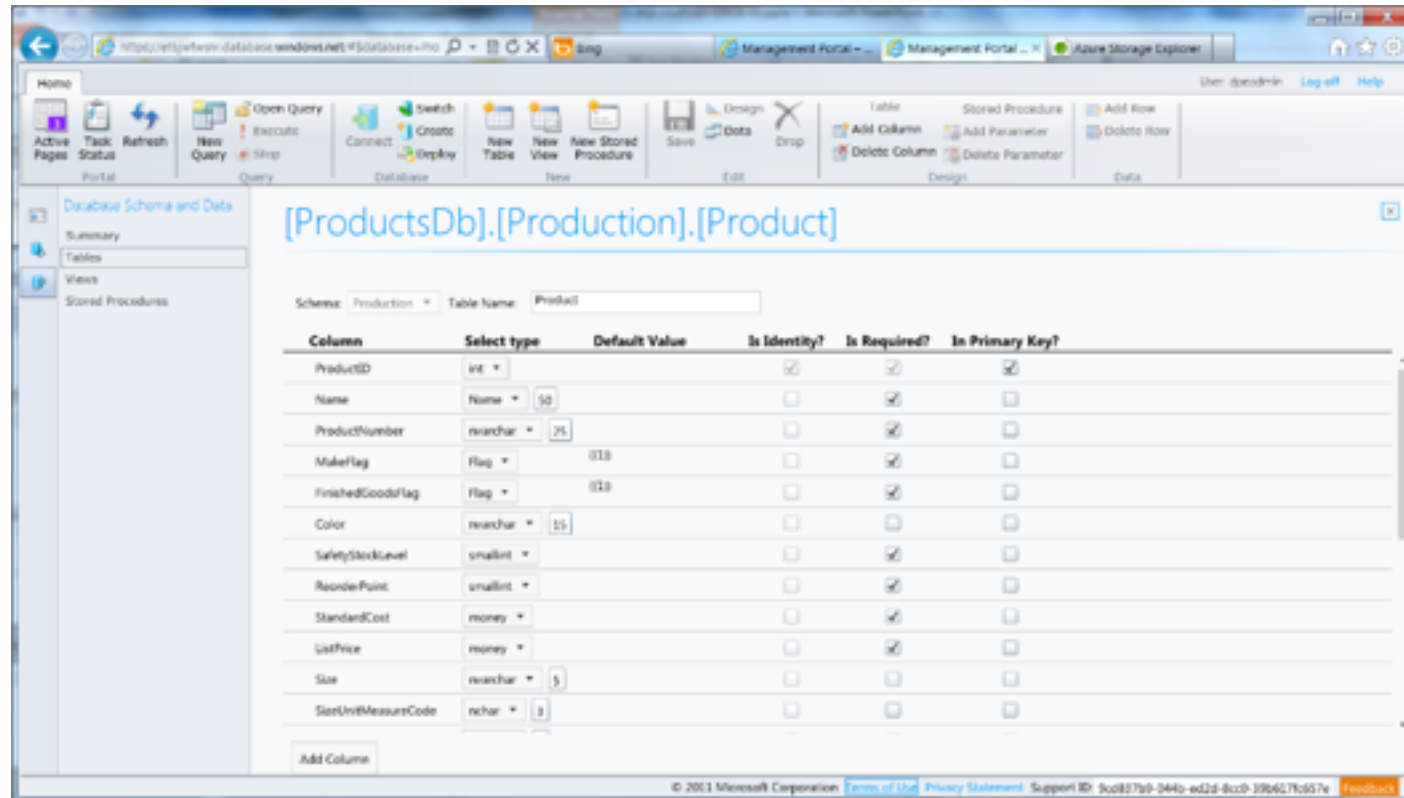
Unsupported SQL Server Features

- Use command, distributed transactions, distributed views
- Service Broker
- SQL Agent
- SQL Profiler
- Native Encryption



Web designers for tables, views, stored procs

Interactive query editing and execution



Elastic Database





Predictable model for deploying large numbers of databases



Elastic Database Model PREVIEW

- Elastic databases, Elastic database pools
- Pooled resources leveraged by many databases
- Standard elastic pool provides 200-1200* eDTUs for up to 100* databases
- Elastic Standard databases can burst up to 100 eDTUs (S3 level)
- Create/configure pool via portal, PowerShell, REST APIs
- Move databases in/out using portal, PowerShell, REST APIs, T-SQL
- Databases remain online throughout
- Monitoring and alerting is available on both pool and databases

Max per-database burst level →

eDTU

200

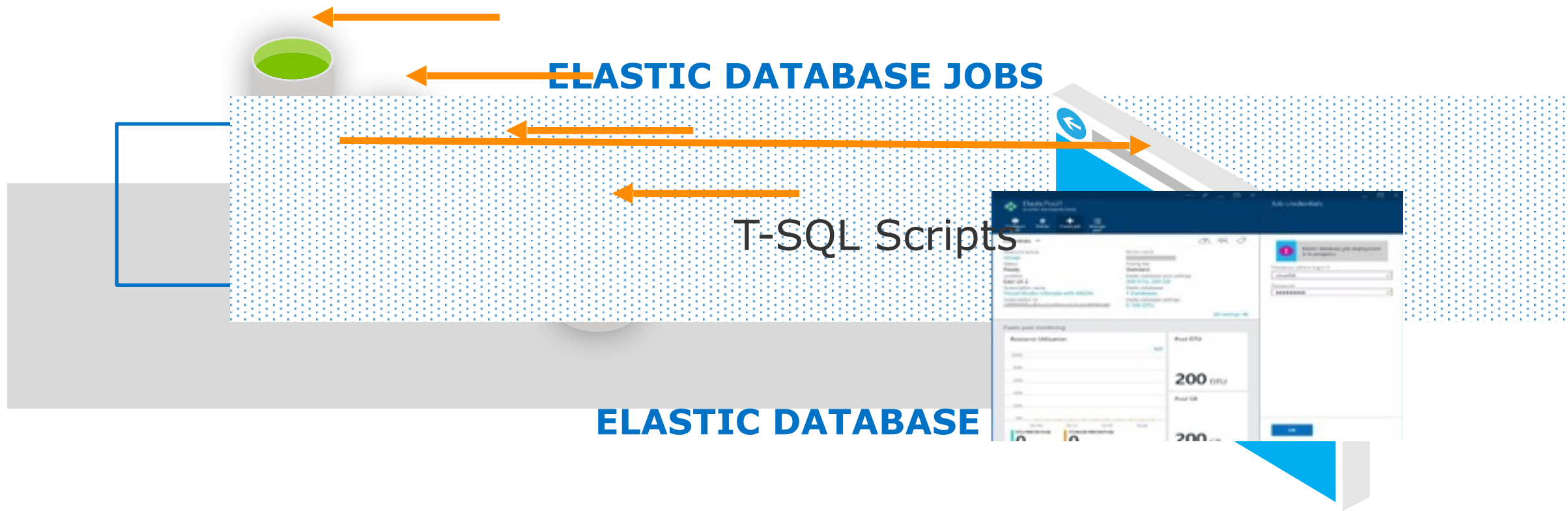
400

800

1200

\$

*Additional pricing tiers may be introduced, and the ranges and limits may be increased during the preview



Execute administrative tasks across each database



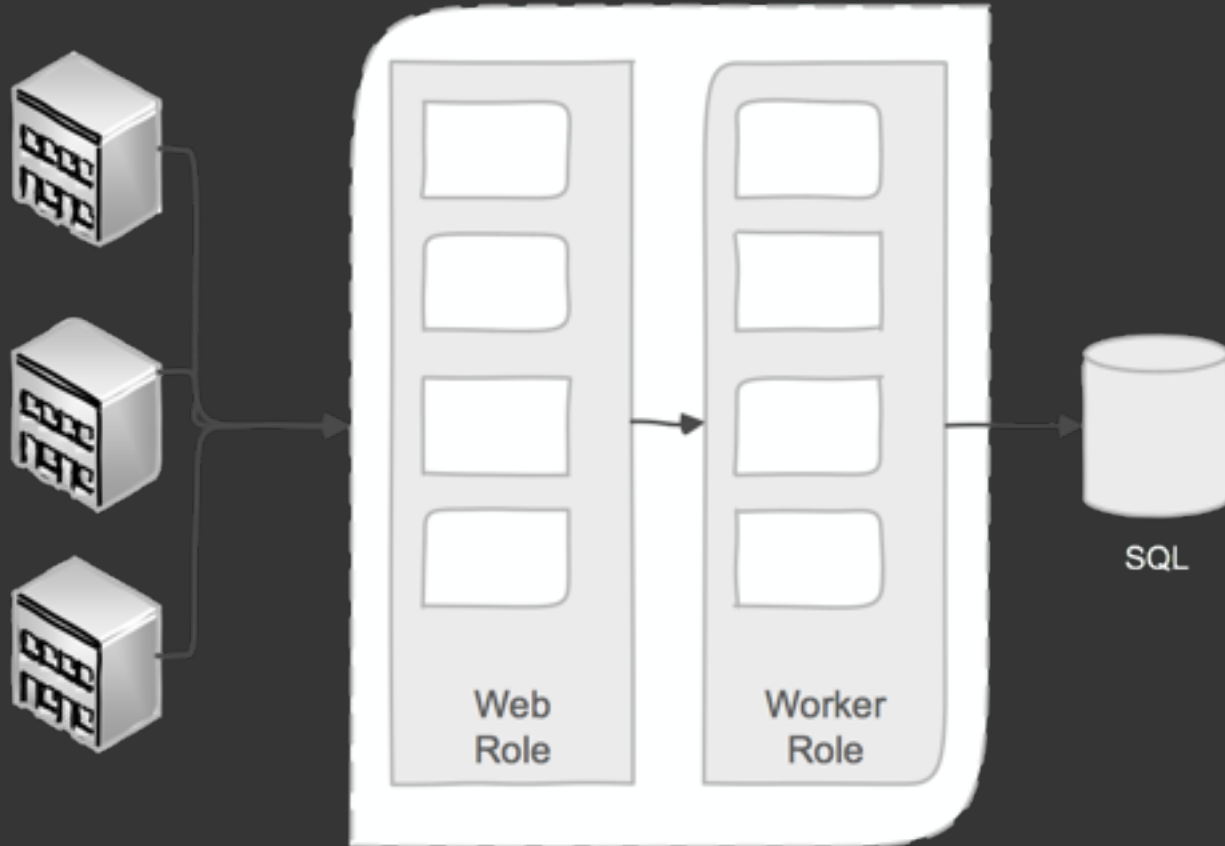
Elastic Database Jobs

- Apply changes or administrative operations to many databases
- Use familiar T-SQL scripts to define jobs
- Built-in automatic retries in case of transient failures
- Tightly integrated with elastic pools in the new Azure Portal
- Designed for batch processing



Elastic Scale



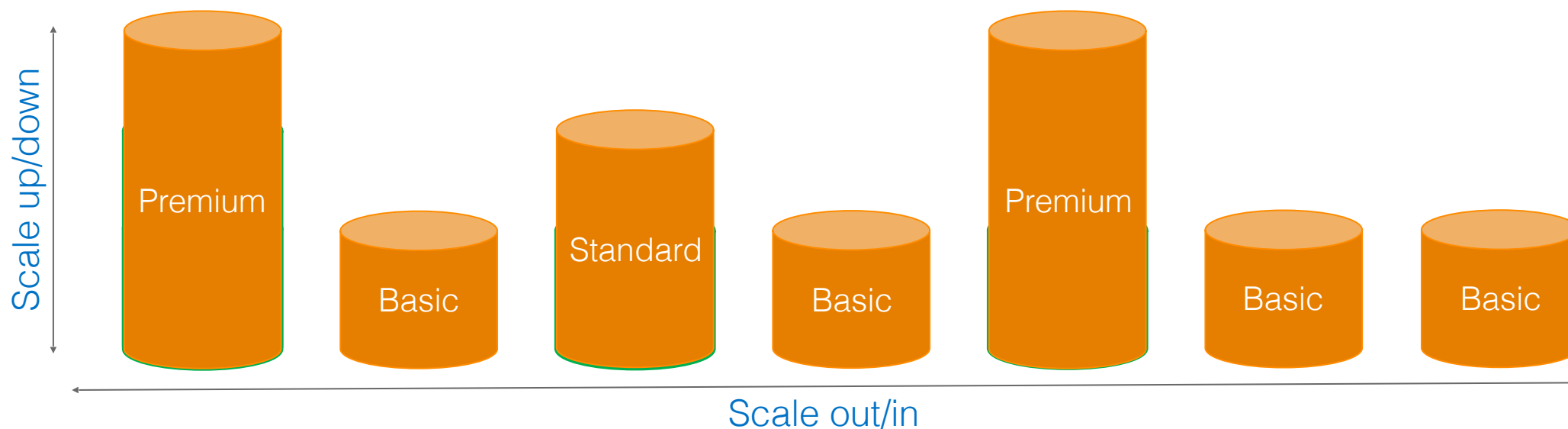


- Classic 3-tier enterprise architecture:
- Scale out the front ends to multiple instances is easy
- Scale the data-tier is more challenging

- Elastic Scale across thousands of databases via custom sharding
- Scale out via .NET Client libraries consumed by customer applications to support sharded database pattern
- Enables developer and manageability functions
- Supports split, merge, and move operations on data

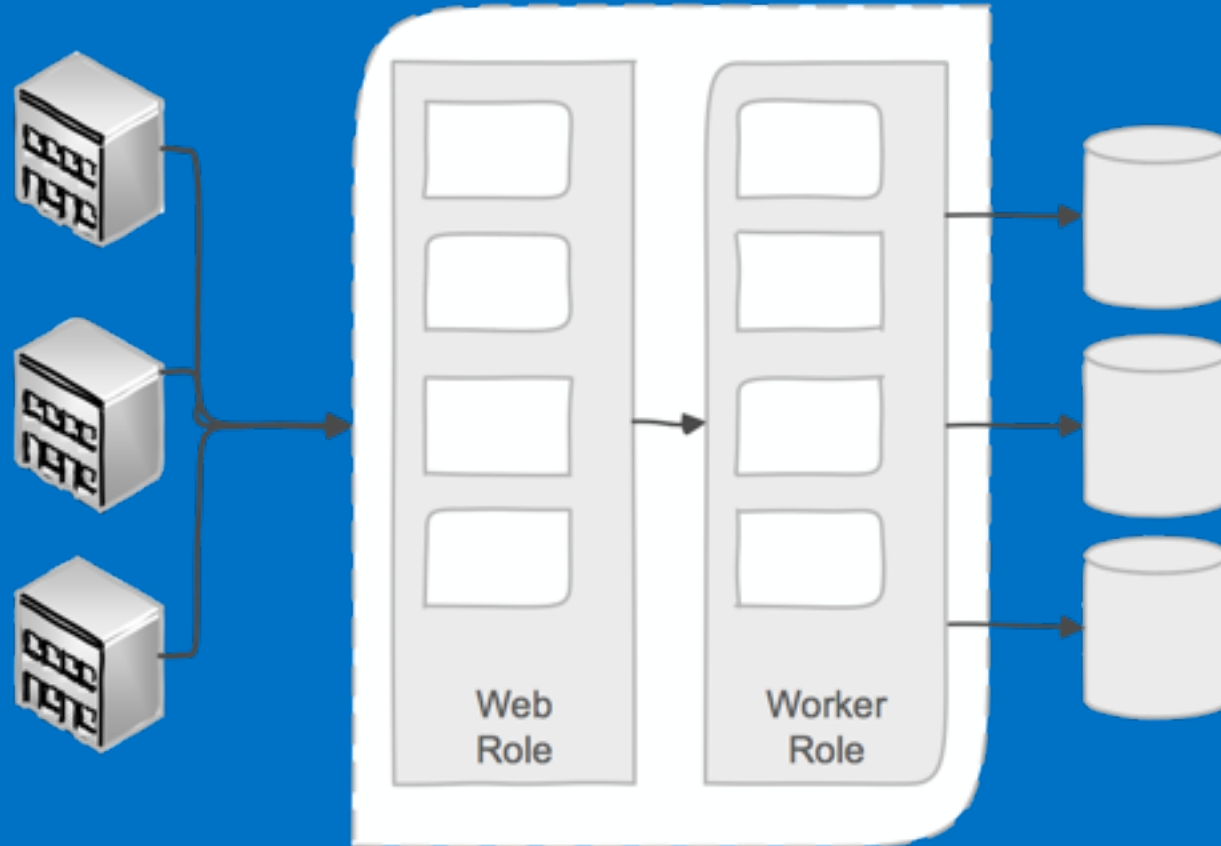
Vertical: Scale-up or scale-down

Horizontal: Scale-out or scale-in



Elastic Scale architecture

Microsoft Azure



SQL Server VM



Run SQL on VM

- Run any SQL product on cloud VM
- Support for SQL Server, Oracle, MySql
- Ready to go VM images available in Gallery
- Persistent storage using attached disk in blob storage
- Has all the benefits and powers of VMs combined with the full features of a SQL Engine

SQL IaaS

SQL Database



SQL Database

SQL IaaS

Microsoft Azure

When you want reduced overhead and possibly need elastic scale.

Customer does not want to add additional IT resources for support and maintenance.

Avoiding CAPEX and OPEX.

Existing applications which requires full box product functionality.

Customer has ecosystem of IT resources for support and maintenance.

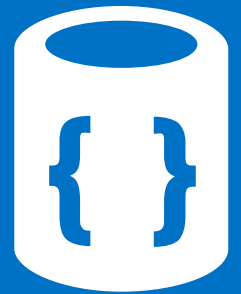
Removing CAPEX.

Other features SQL IaaS supports that SQL Database doesn't (yet)

- Full SQL Server functionality (e.g. Reporting Services)
- Windows authentication available (requires VM to be joined to on-premises domain)
- Larger database sizes possible (16TB)

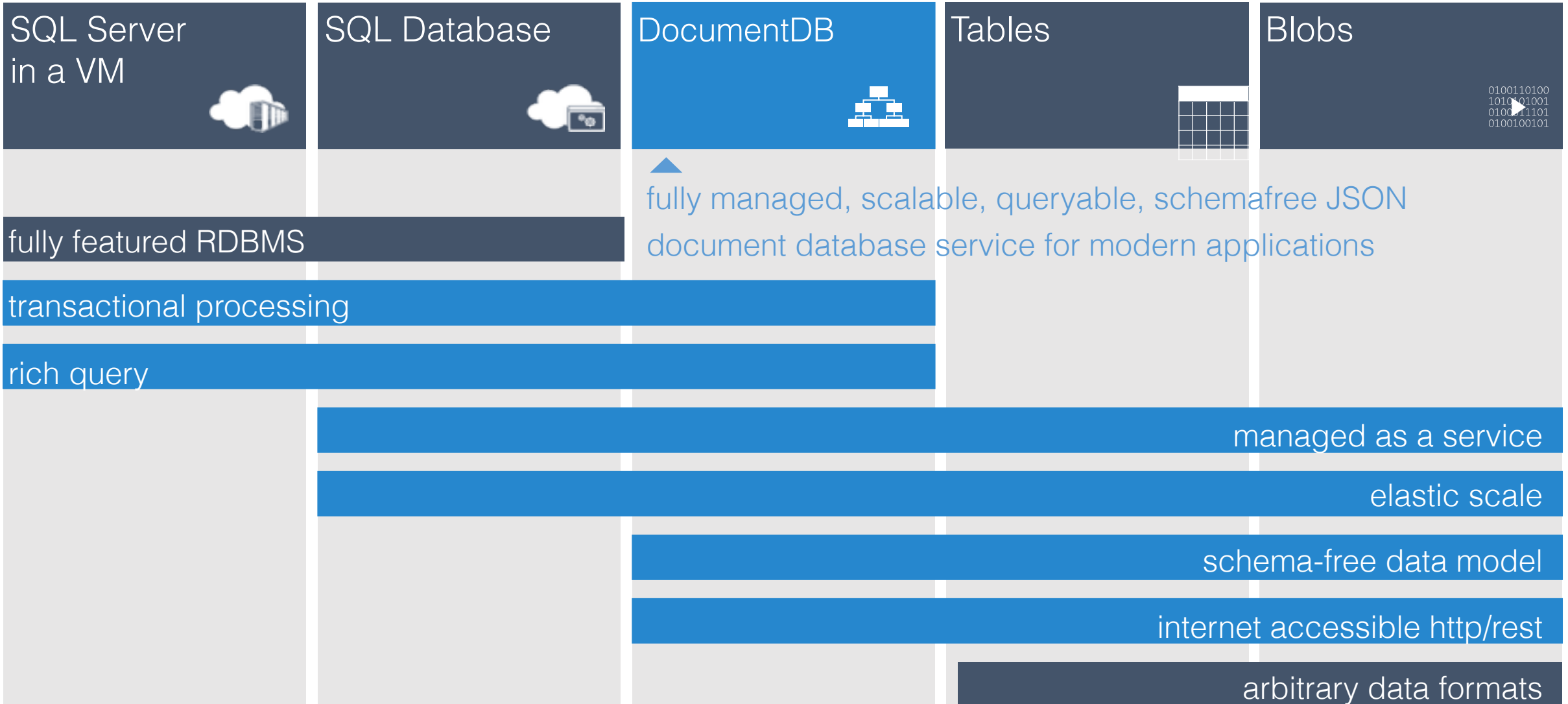


DocumentDB



Fully managed, scalable JSON document database service

Microsoft Azure Data Services



MongoDB

Existing applications which require extra capacity for scale out and can not be migrated

Customer has ecosystem of IT resources for support and maintenance

Removing CAPEX

Mongo MMS compatibility

DocumentDB

Microsoft Azure

Applications that need managed elastic scale, query over schema free data, native JSON/JavaScript support

Customer does not want to add additional IT resources for support and maintenance

Avoiding CAPEX and OPEX

Built-for-the-cloud database technology

Tunable Consistency – four distinct levels

Strong
Bounded Stateless
Session
Eventual

Tunable Consistency
Strong

All writes are visible to all readers.
Writes synchronously committed by a majority quorum of replicas and reads are acknowledged by the majority read quorum.



Tunable Consistency
Bounded Stateless

Guaranteed ordering of writes, reads adhere to minimum freshness. Writes are propagated asynchronously, reads are acknowledged by majority quorum lagging by at most K prefixes.



Tunable Consistency
Session

Read your own writes. Writes are propagated asynchronously while reads for a session are issued against the replica that can serve the requested version.



Tunable Consistency
Eventual

Reads eventually converge with writes. Writes are propagated asynchronously while reads can be acknowledged by any replica. Readers may view older data than previously observed.



| | Writes | Reads |
|--------------|--------------------|--------------------------|
| Strong | sync quorum writes | quorum reads |
| Bounded | async replication | quorum reads |
| Session * | async replication | session bound replica |
| Eventual | async replication | any replica |

* Ideal consistency and performance tradeoff for many application scenarios. High performance writes and reads with predictable consistency.

Partitioning Data

Hash Range Lookup

Partitioning **Hash**

Partitions are assigned based on the value of a hash function, allowing you to evenly distribute requests and data across a number of partitions



Partitioning **Range**

Partitions are assigned based on whether the partition key is within a certain range.



Partitioning **Lookup**

Partitions are assigned based on a lookup map that assigns discrete partition values to specific partitions a.k.a. a partition or shard map.



Search





Azure Search

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.



Azure Search

Perfect for enterprise cloud developers, cloud software vendors, cloud architects who need a fully-managed search solution.



Search Functionality

- Simple HTTP/JSON API for creating indexes, pushing documents, searching
- Keyword search with user-friendly operators (+, -, *, "", etc.)
- Hit highlighting
- Faceting (histograms over ranges, typically used in catalog browsing)



Search Functionality

- Suggestions (auto-complete)
- Rich structured queries (filter, select, sort) that combines with search
- Scoring profiles to model search result relevance
- Geo-spatial support integrated in filtering, sorting and ranking



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

Overview

My Search

Summary

Monitoring

Document Count

Storage Use

1,234

40.09 GB

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

trailapp

pricing tier

Standard

RESOURCE GROUP

Configure required settings

SUBSCRIPTION

Configure required settings

LOCATION

Configure required settings

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



at 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

Summary


Monitoring

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

1 NOTIFICATIONS

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

trailapp SEARCH SERVICE

running

trailapp SEARCH SERVICE

START STOP DELETE

Summary

searchtestgroup2

trailapp Search service

Search services 2 instances

Quick start

PROPERTIES KEYS

Usage

| Scale | |
|--------------|---|
| Replicas | 1 |
| Partitions | 1 |
| Search units | 1 |

Index

Indexes

2

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

Replicas

1

Partitions

1

Search units

1

Index

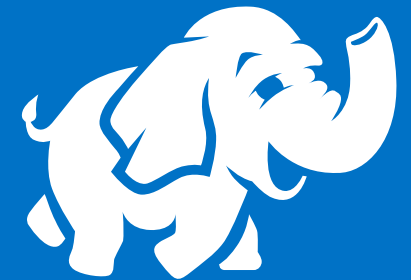
Indexes

Indexes

TRAILSAPP

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

HDInsight





| | | |
|-----------|-------------------------|-----------------------------|
| Data size | Gigabytes (Terabytes) | Petabytes (Hexabytes) |
| Access | Interactive and Batch | Batch |
| Updates | Read / Write many times | Write once, Read many times |
| Structure | Static Schema | Dynamic Schema |
| Integrity | High (ACID) | Low |
| Scaling | Nonlinear | Linear |

Reference: Tom White’s Hadoop: The Definitive Guide

Programming HDInsight
– Existing ecosystem

Hive
Pig
Mahout
Cascading
Scalding
Scoobi
Pegasus
...



Programming HDInsight
– Microsoft .NET

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



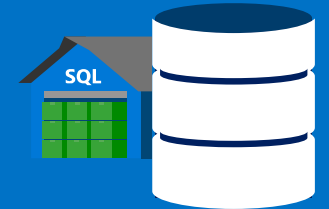
Programming HDInsight
– DevOps / IT Pros

PowerShell

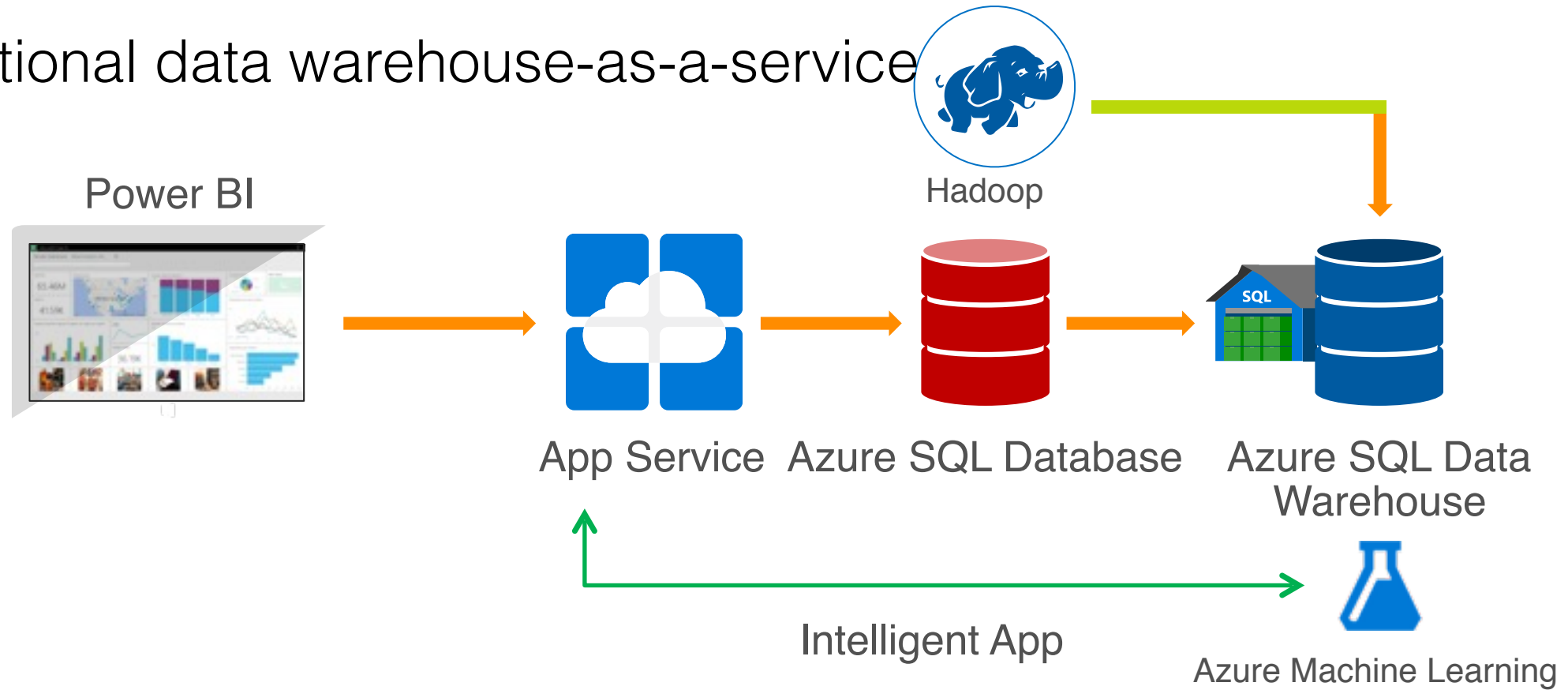
Cross-Platform CLI tools (xplat-cli)



Data Warehousing



A relational data warehouse-as-a-service



Elastic scale & performance

Scales to petabytes of data

Massively Parallel Processing

Instant-on compute scales in seconds

Query Relational / Non-Relational

Powered by the Cloud

Get started in minutes

Integrated with Azure ML, PowerBI & ADF

Enterprise Ready

Market Leading Price & Performance

Simple billing compute & storage

Pay for what you need, when you need it with dynamic pause

Bring DW to the Cloud without rewriting



Data Lake



Azure Data Lake service

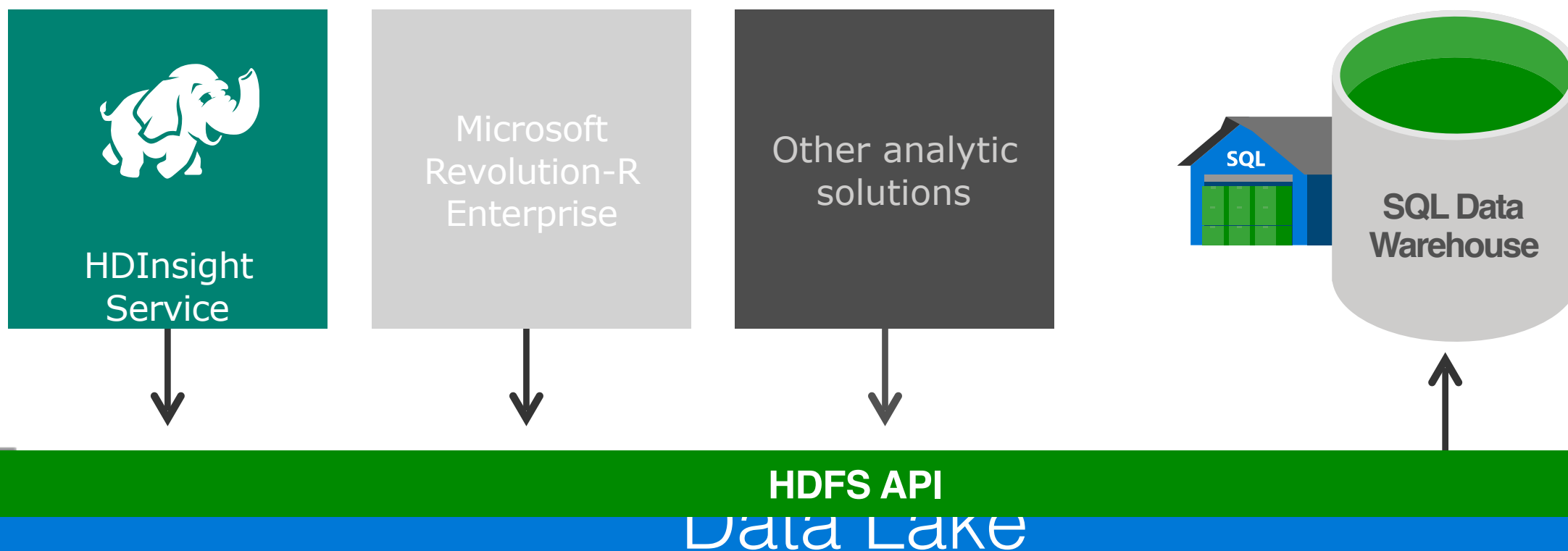


- Store and manage infinite data
- Keep data in its original form
- High through put, low latency analytic jobs
- Enterprise-grade security + access control



Data Lake service

Transformative way to store and process infinite data



MongoDB, MySQL, Oracle, Cassandra, Neo4j and more

Additional Database options in Azure

- Azure Table Service is a “Big Table” entity store.
- MongoDB is a document (JSON) store.
- Cassandra is a columnar store with excellent replication.
- HBase is a Big Data (Hadoop) store available in HDInsight.
- Oracle VMs are supported in Azure.
- MySQL is offered from the partner ClearDB.

Microsoft Azure Data Platform

Microsoft Azure

SQL Database

SQL on IaaS

DocumentDB

MongoDB,
MySQL, Oracle,
Cassandra,
Neo4j and more

HDInsight

Search