



Database-per-tenant Architecture using .NET Core and Azure SQL

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AZURE ARCHITECT



DEVOPS CONSULTANT

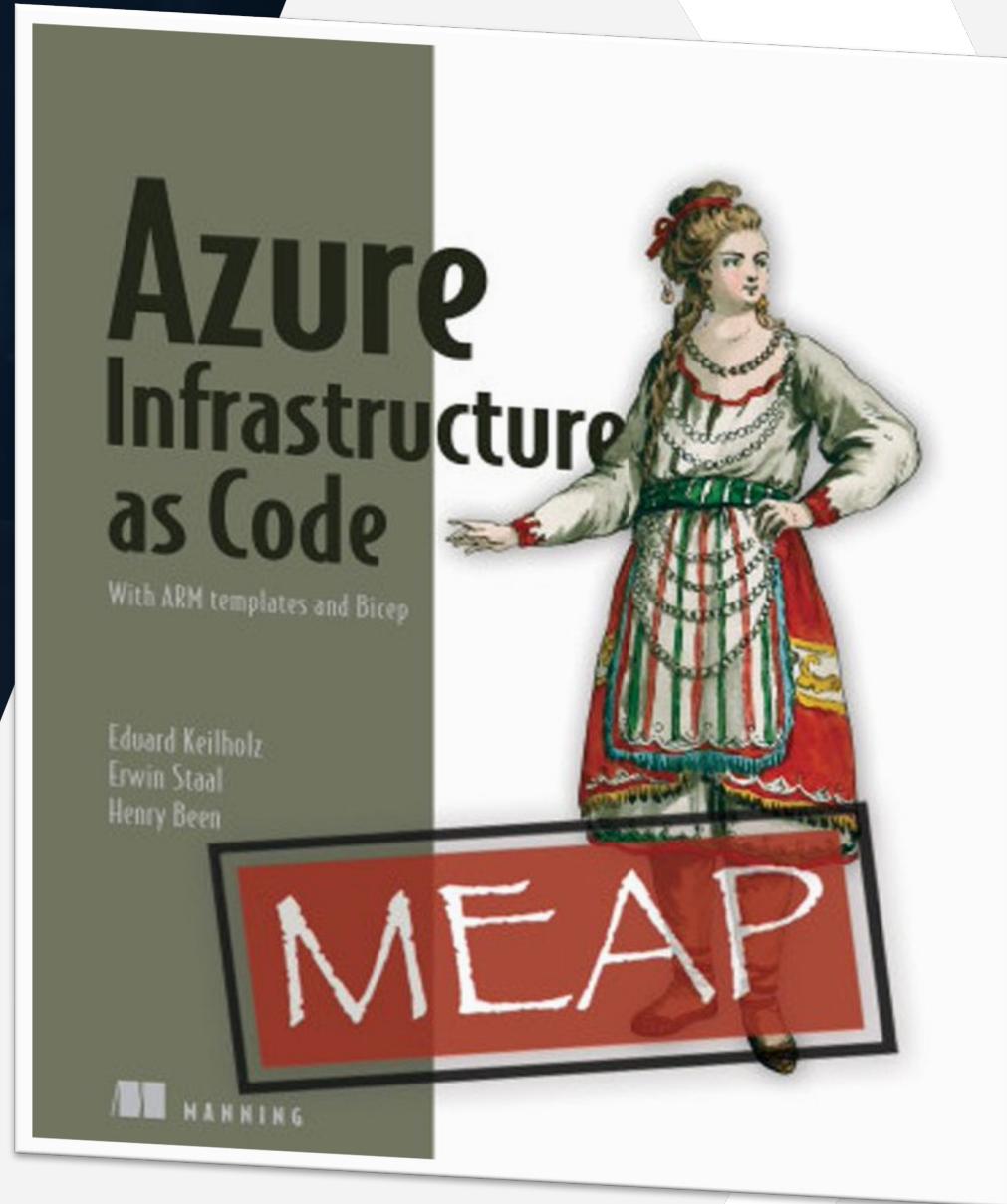


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<https://www.manning.com/books/azure-infrastructure-as-code>
ctwdevweeksd22

Database-per-tenant

Architecture

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Architecture

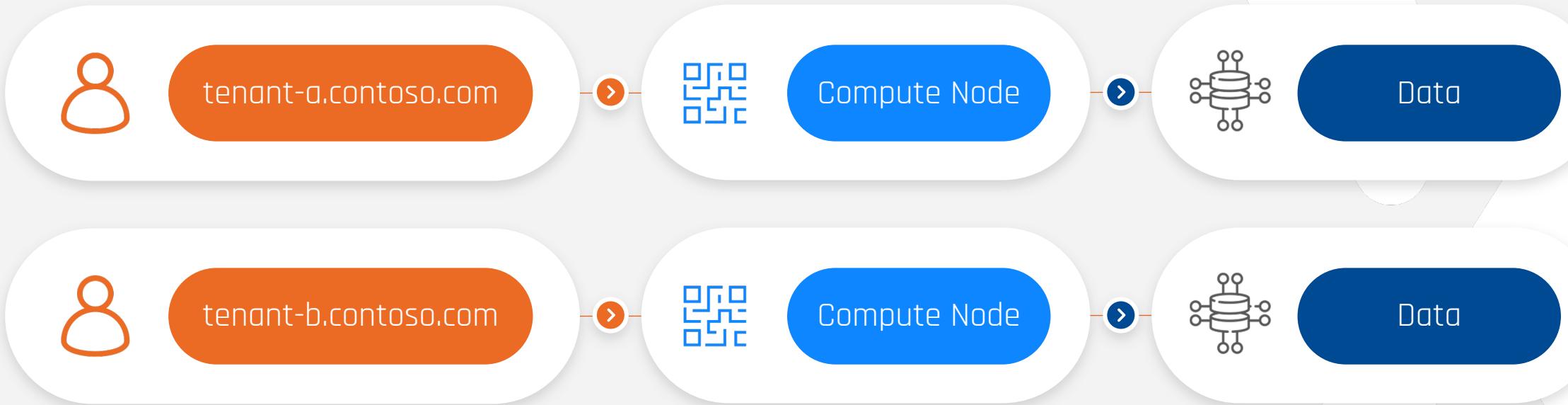
Database-per-tenants

Architecture

Software as a Service

SaaS is a software licensing and delivery model in which software is licensed on a subscription basis, is centrally hosted, and accessed by users using a web browser.

Single tenant architecture

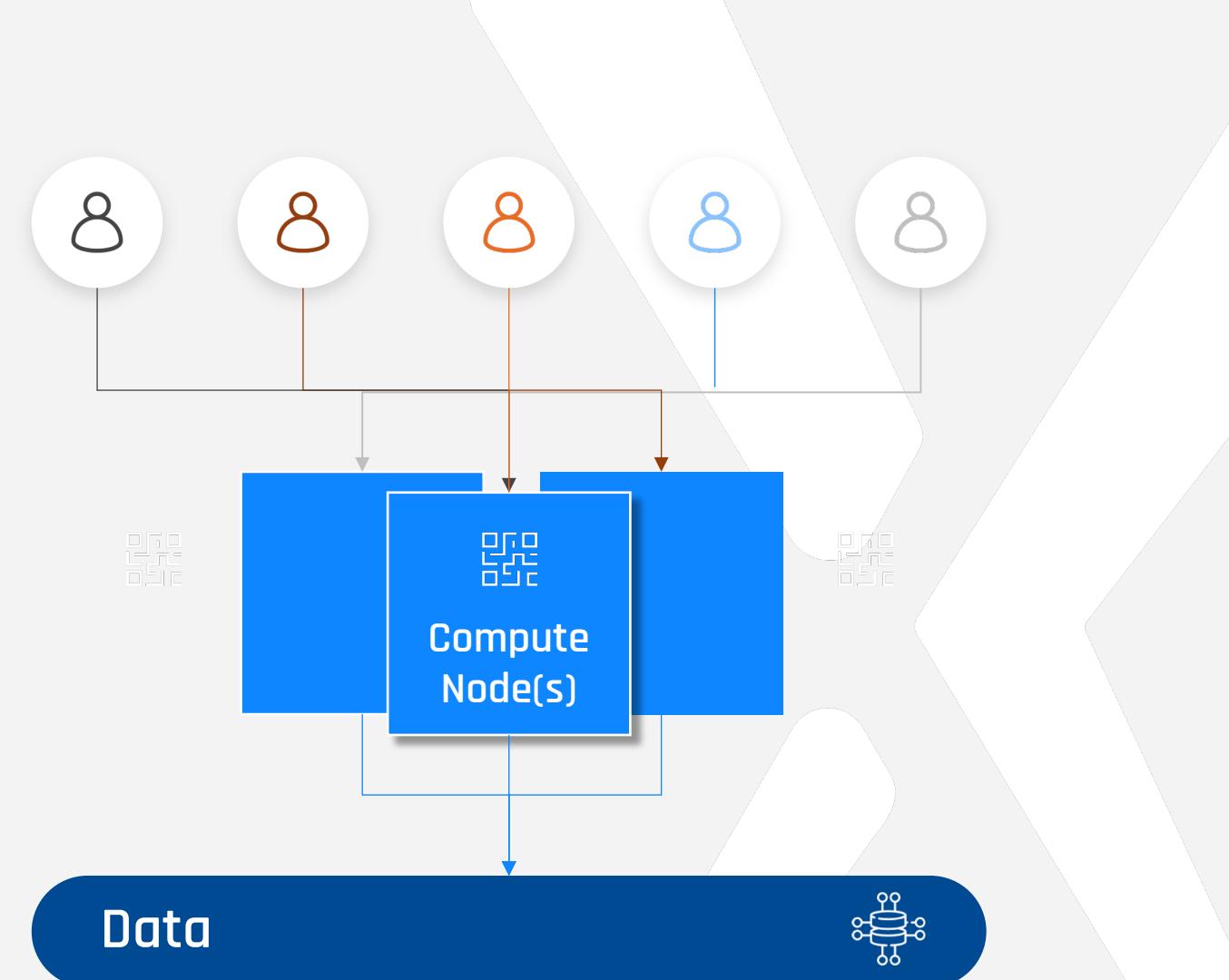


- Isolation
- No noisy neighbour

- Easy backup
- Customization

- Setup
- Scaling

- Monitoring
- Maintenance



Multi-tenant trade-offs and considerations



Tenant Isolation

- Security
- Noisy neighbours
- Backup & restore
- Specific customizations



Cloud resource costs

- Optimize for lower cost
- Sharing resources
- Optimize resource utilization



Engineering & Daily Ops

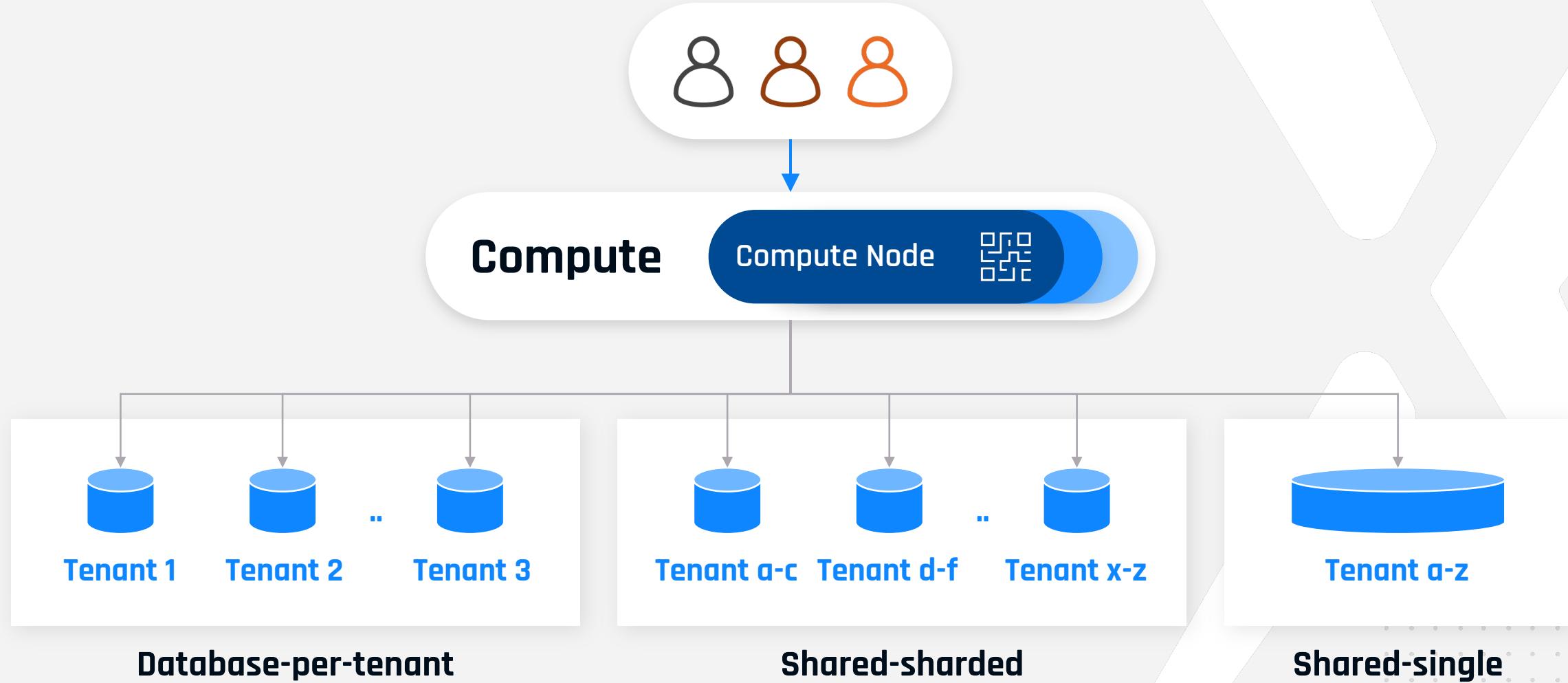
- Isolation protection
- Maintain application
- Database schema
- Monitor
- Trouble shoot



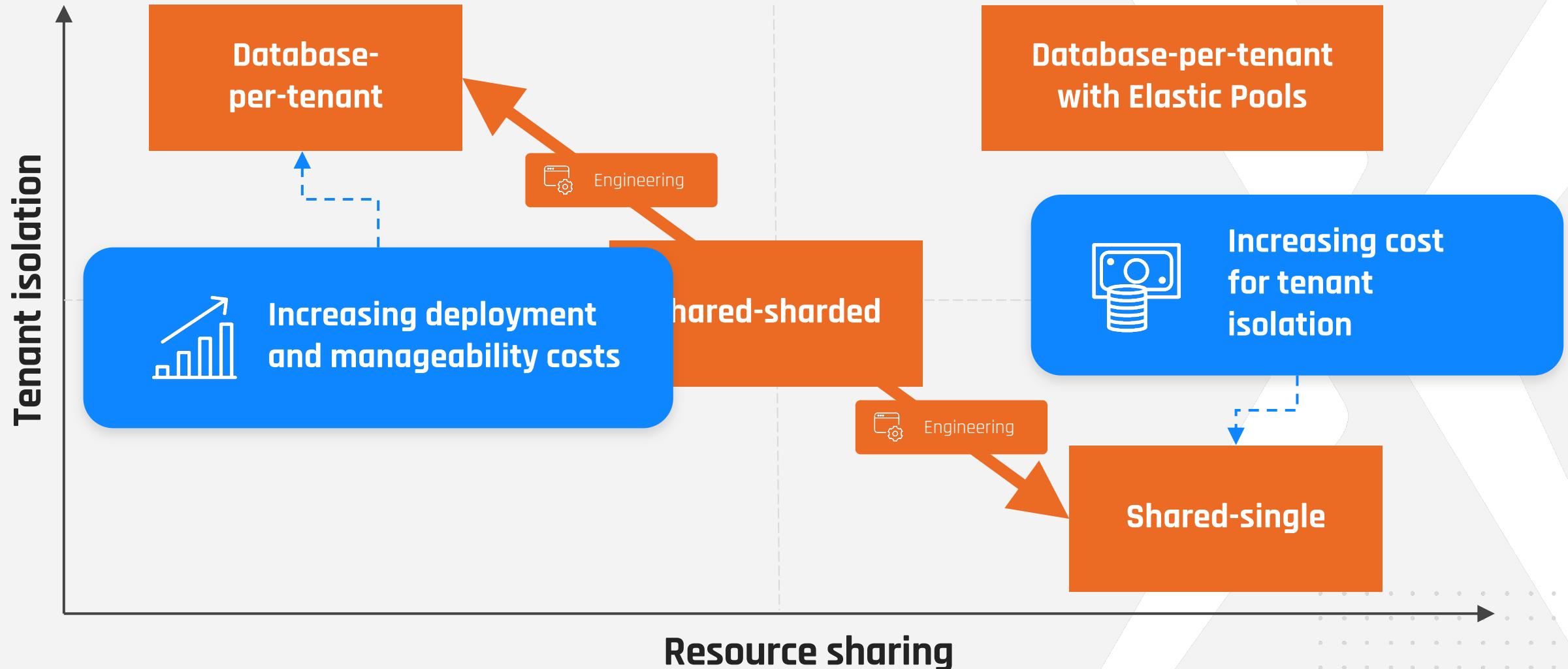
Scalability

- Adding tenants
- Adding compute capacity

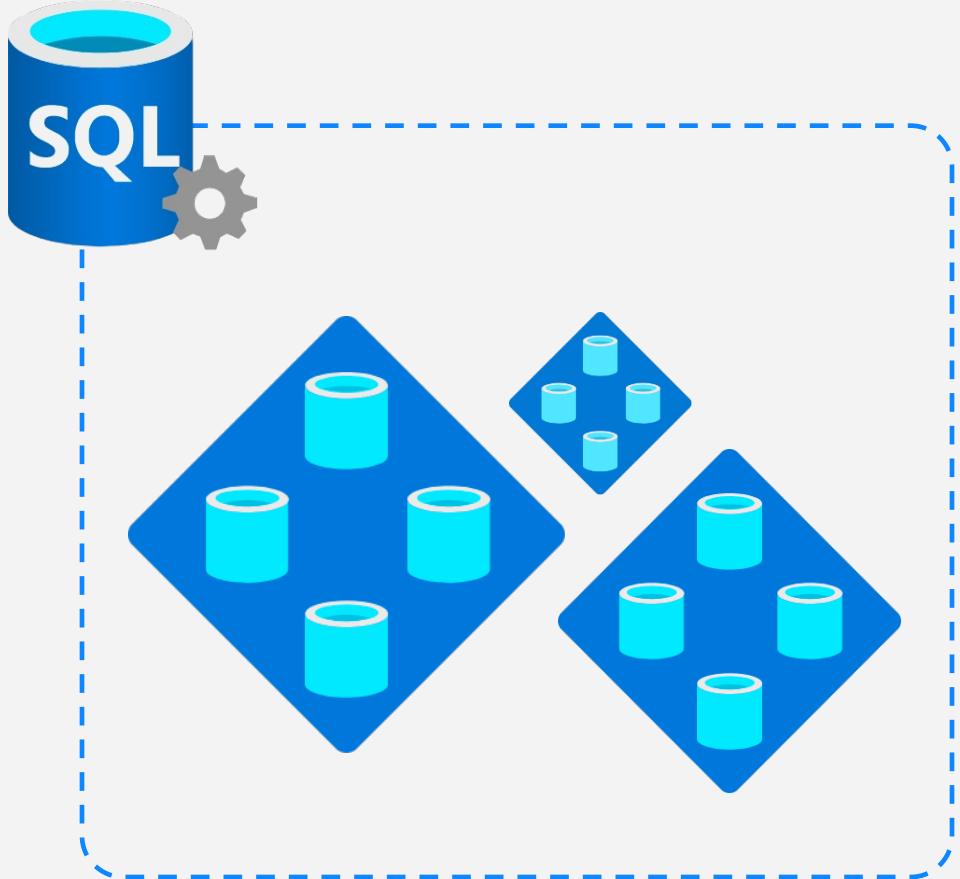
Multi-tenant database models



Characterization of multi-tenant data models



Azure SQL Elastic pooling



Capacity per pool, not per database



Pay per pool, not per database

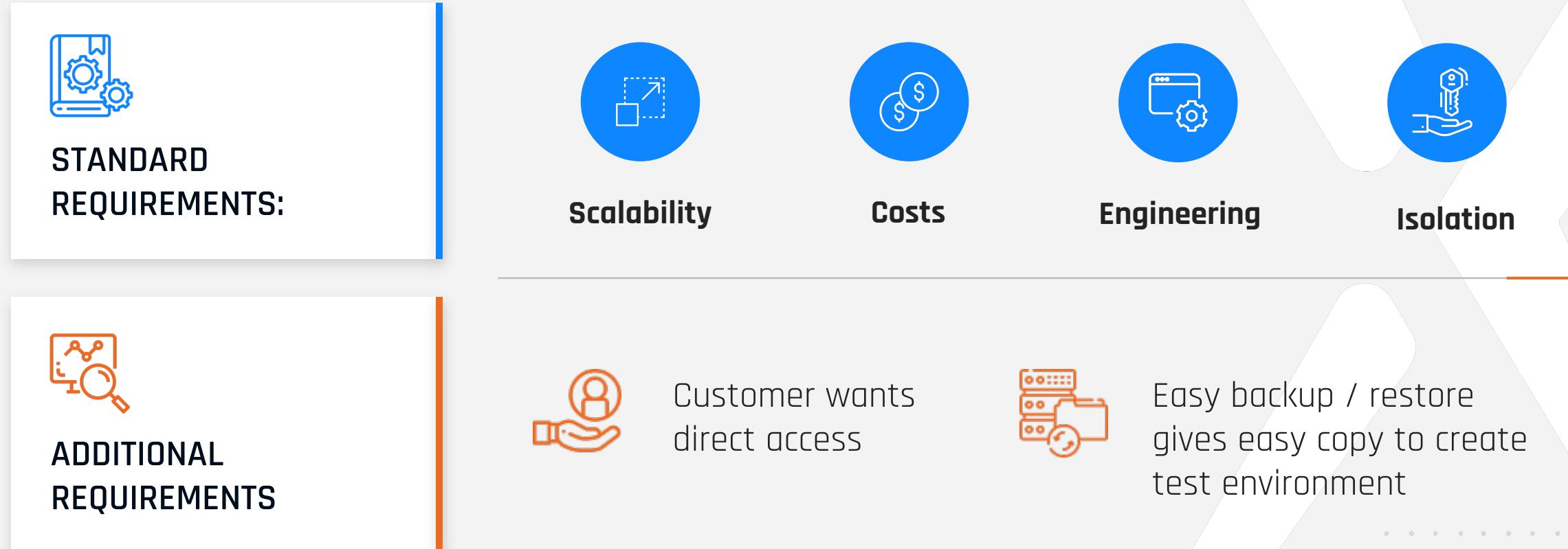


Pool size (eDTU) dictates number of databases per pool (ranging from 100 to 500) and storage

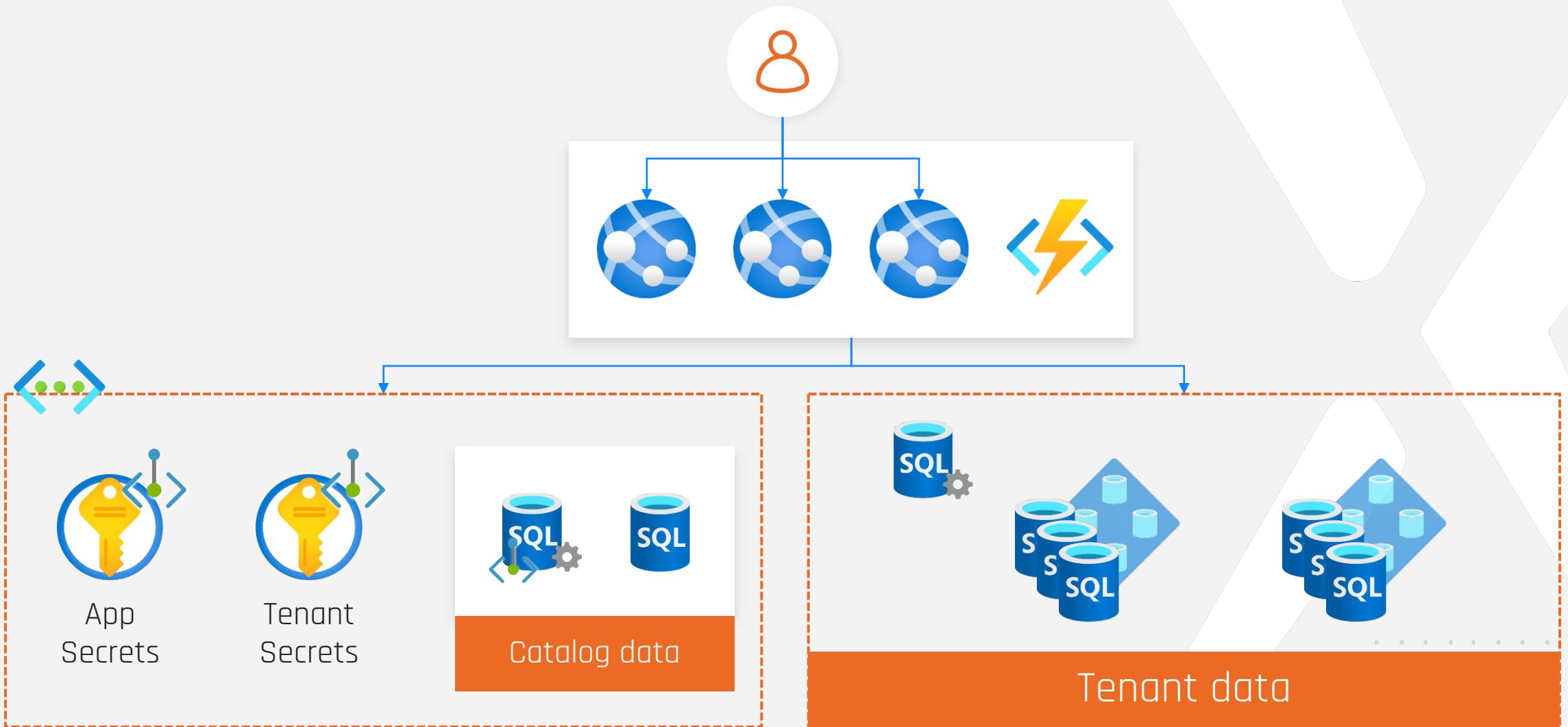


Set max eDTU usage per database to prevent noisy neighbour

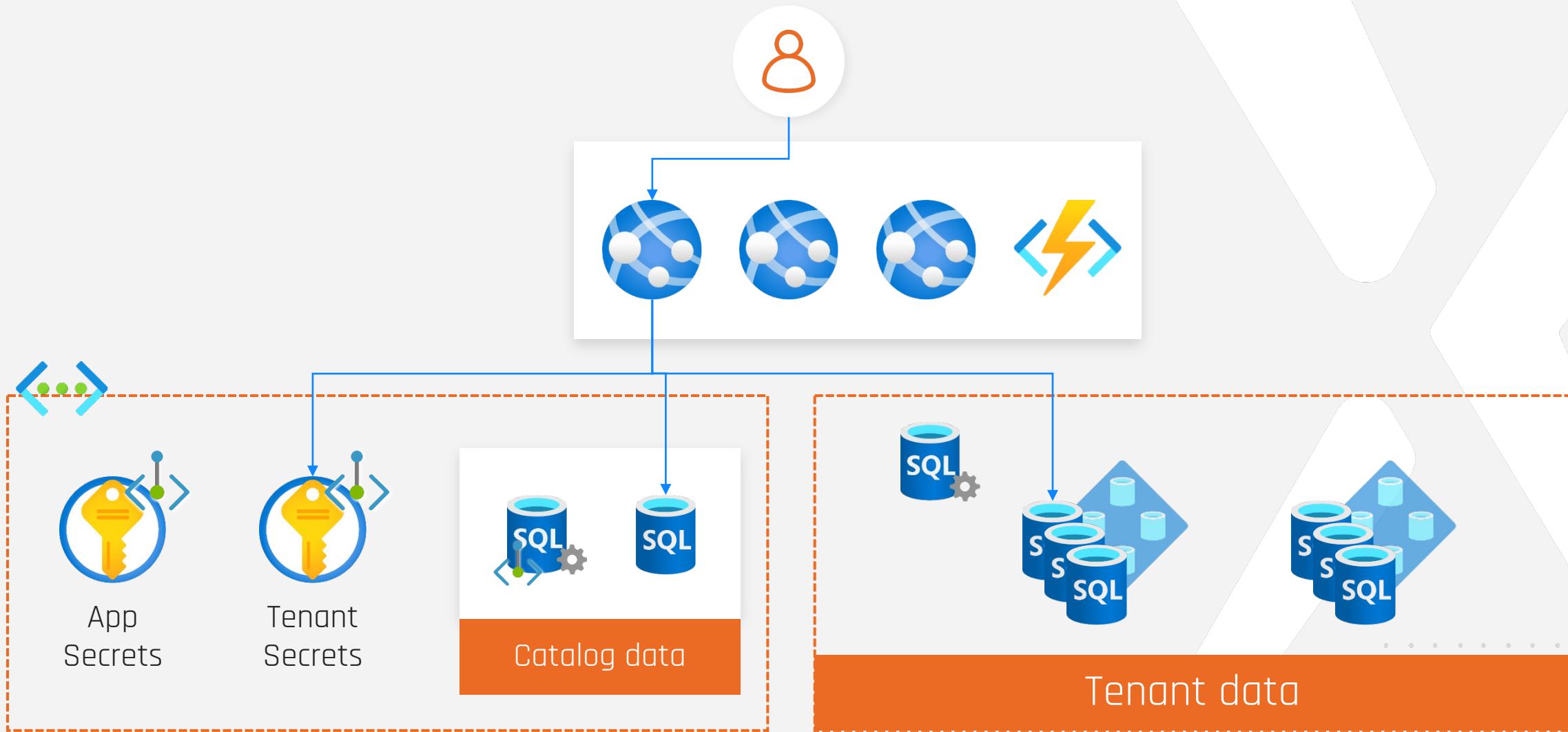
Our solution: database-per-tenant using Elastic Pools



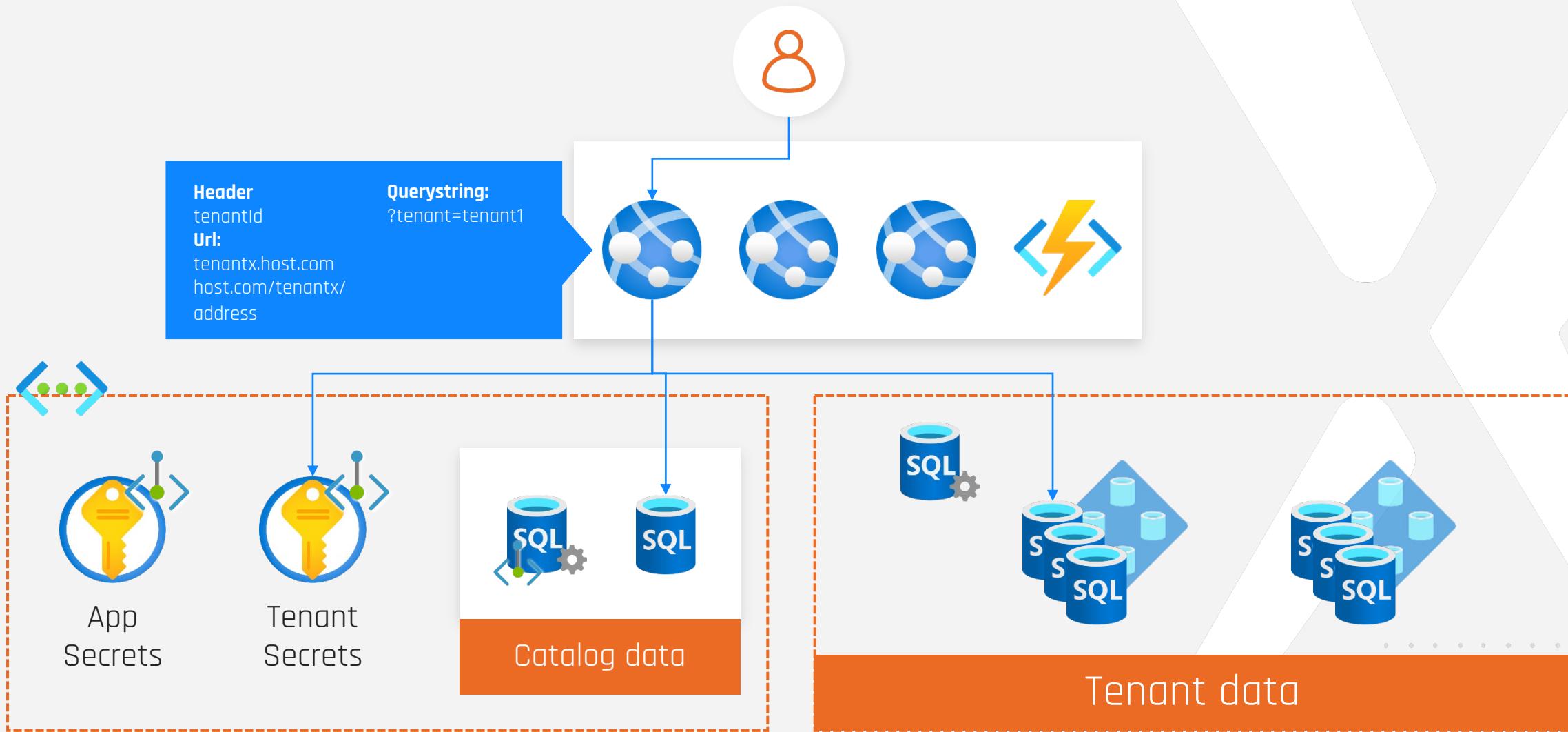
Infrastructure



Infrastructure

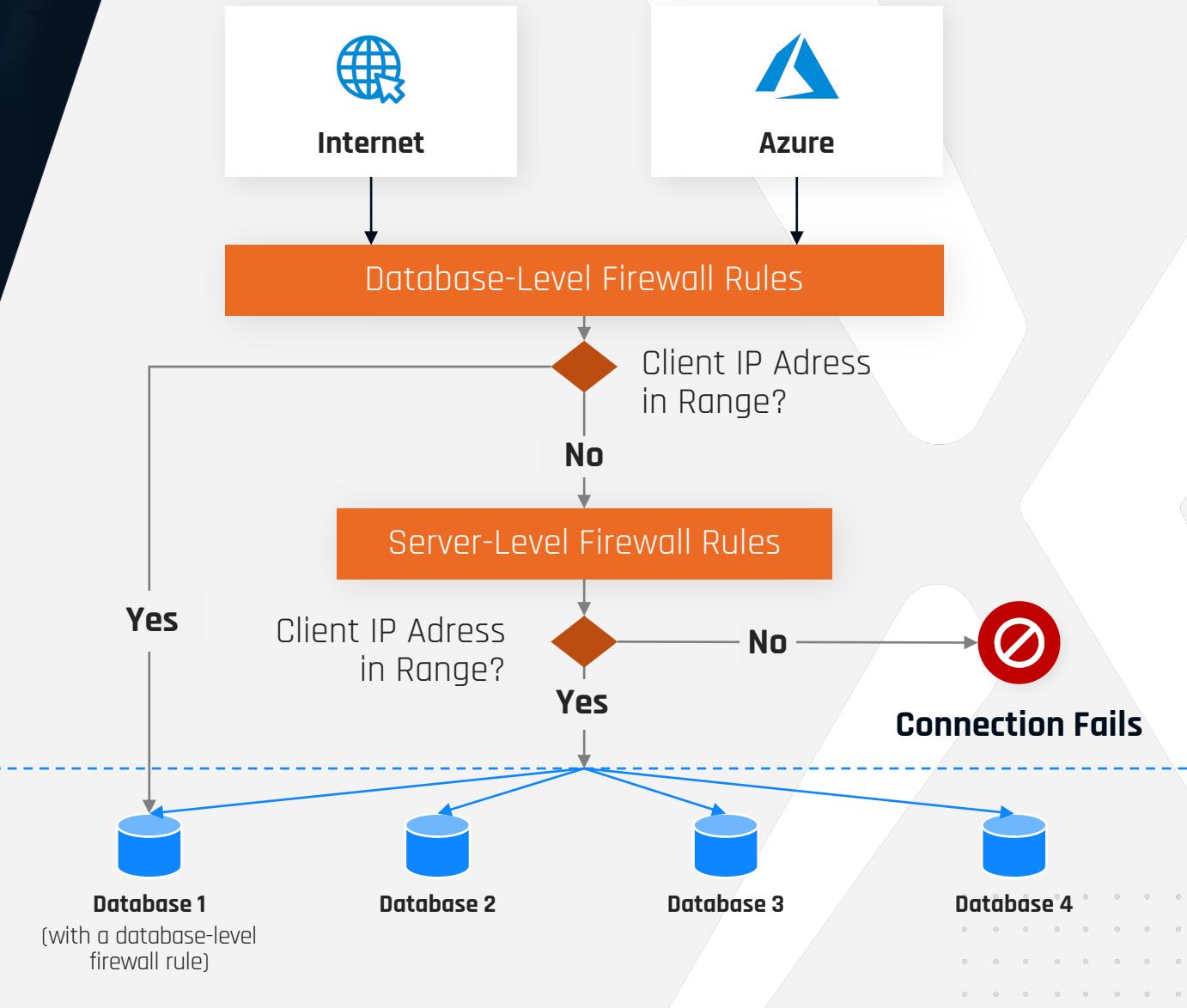


Infrastructure



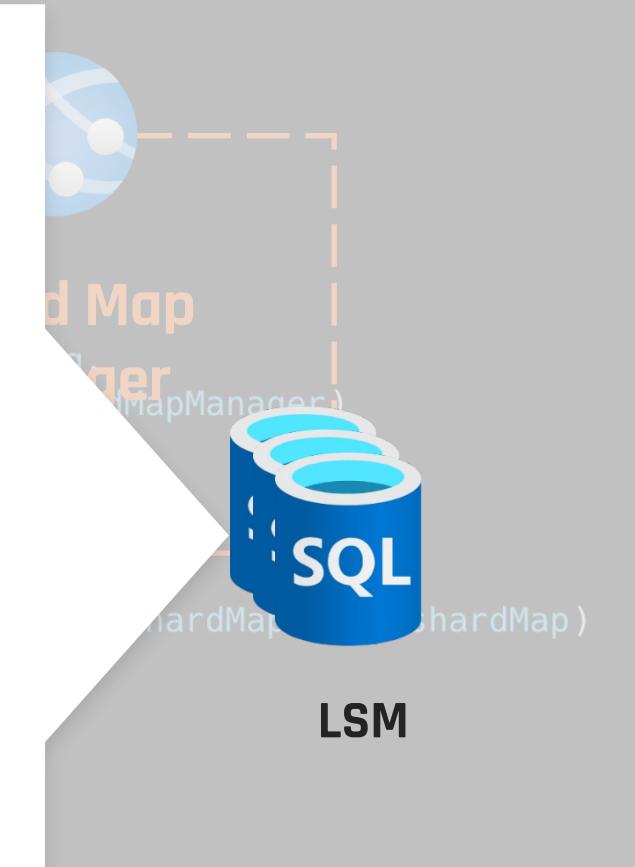


Azure SQL Firewall



Elastic Database Tools

- ✓  sqldb-databasepertenant-erwinsdbmigrations-test (sql-databasepertenant-tenants1-test)
 - ✓  Tables
 - >  __ShardManagement.ShardMapManagerLocal
 - >  __ShardManagement.ShardMappingsLocal
 - >  __ShardManagement.ShardMapsLocal
 - >  __ShardManagement.ShardsLocal
 - >  dbo.__EFMigrationsHistory
 - >  dbo.BuildVersion
 - >  dbo.ErrorLog
 - >  SalesLT.Address
 - >  SalesLT.Customer
 - >  SalesLT.CustomerAddress
 - >  SalesLT.Product
 - >  SalesLT.ProductCategory
 - >  SalesLT.ProductDescription
 - >  SalesLT.ProductModel
 - >  SalesLT.ProductModelProductDescription
 - >  SalesLT.SalesOrderDetail
 - >  SalesLT.SalesOrderHeader

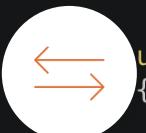


Elastic Database Tools

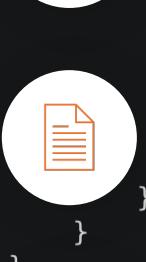


2 types of Shard Mapping

```
using (var conn = new MultiShardConnection(myShardMap.GetShards(), myShardConnString))
{
    using (MultiShardCommand cmd = conn.CreateCommand())
    {
        cmd.CommandText = "SELECT c1, c2, c3 FROM ShardedTable";
        cmd.CommandType = CommandType.Text;
        cmd.ExecutionOptions = MultiShardExecutionOptions.IncludeShardNameColumn;
        cmd.ExecutionPolicy = MultiShardExecutionPolicy.PartialResults;
    }
}
```



Supports Split / Merge / Move



Cross tenant reporting
/multi-shard query's

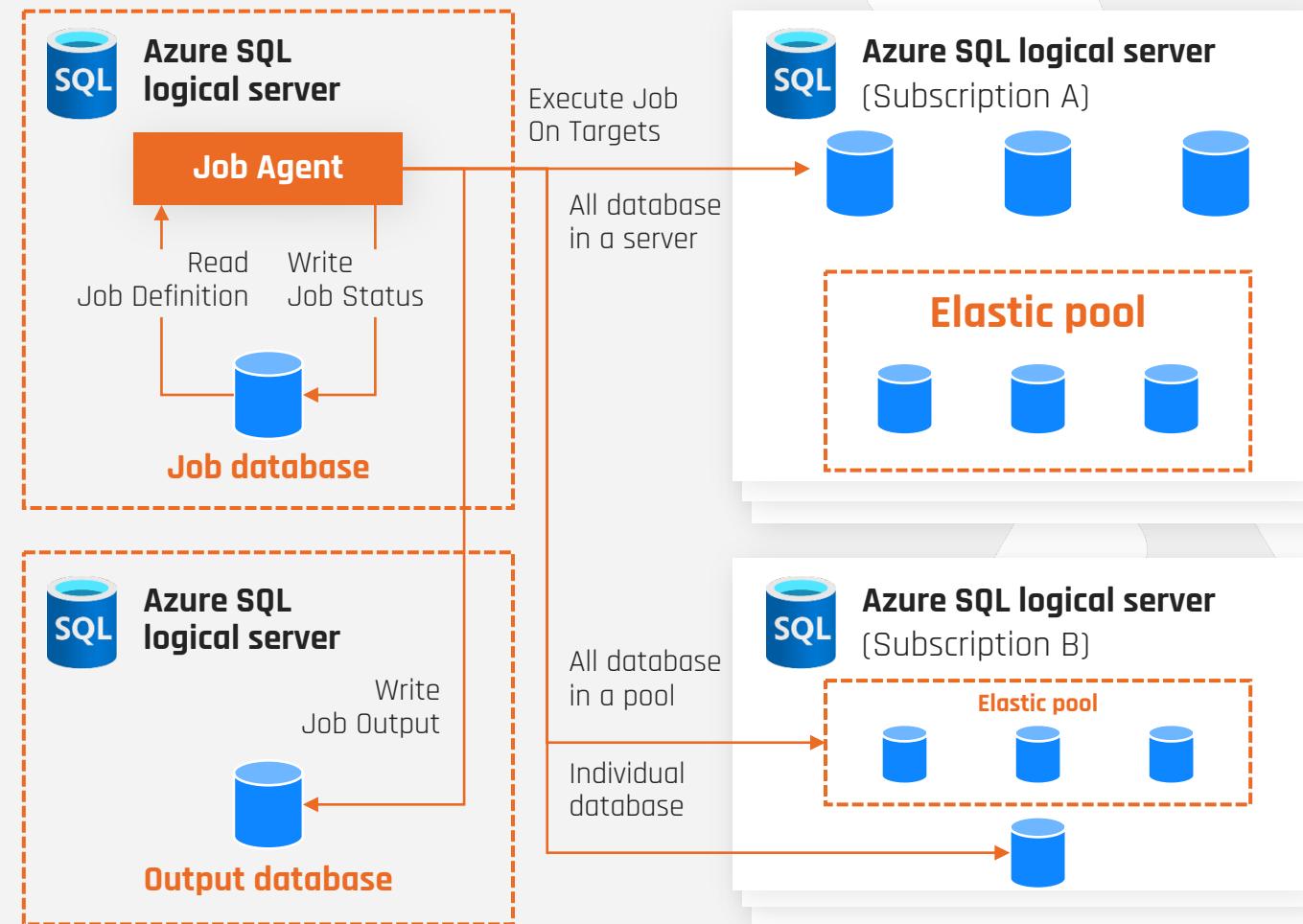


Elastic Jobs



Elastic Database Tools - Elastic Jobs

Run one or more T-SQL scripts in parallel	
On a schedule or on-demand	
Across a large number of databases	
Ideal for :	



DEMO



Create new tenant



Copy tenant



Create ShardMapManager



Connect to specific tenant

Thank you!

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<https://www.erwinstaal.nl> - <https://www.github.com/staal-it>