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Building scalable web applications with Azure services

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Agenda for today

01 Intro

02 Modern web applications

03 Essentials of building a scalable web application on Azure

04 Case study

05 Q&A

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Facts:

30+
Years in business

100+
Customers

200+
Employees

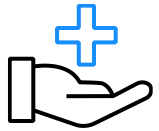
Cloud services:

- ✔ Consulting & advisory
- ✔ Modernisation & migration
- ✔ Optimisation & automation
- ✔ Support & maintenance

Banking & finance

Energy

Telecommunications



Healthcare & Pharmacy

Insurance

IT & consulting

Microsoft Partner

Microsoft

Gold Cloud Platform
Gold Data Analytics
Gold Application Integration
Gold Application Development

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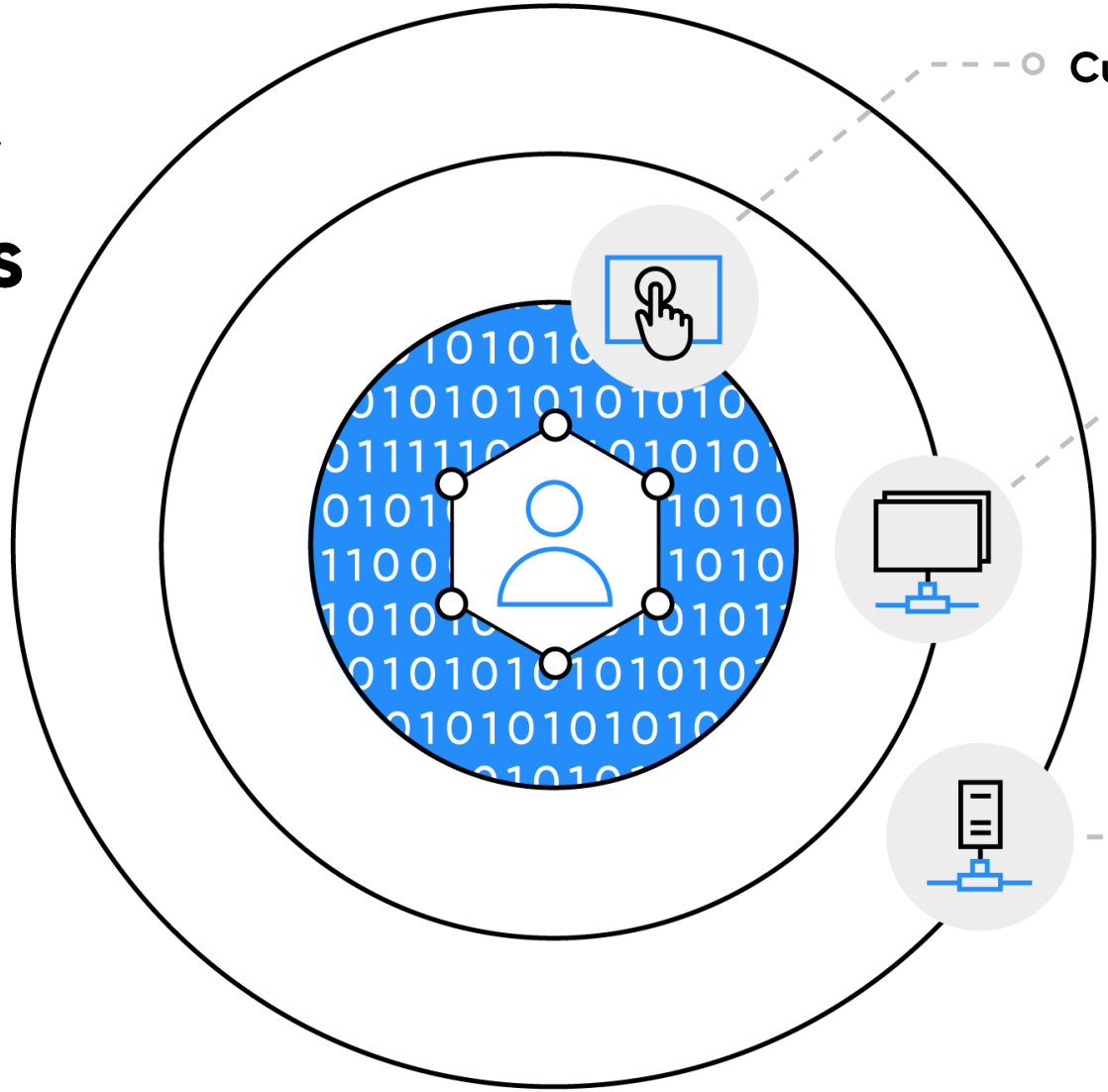
Business is powered by applications



Customer-facing applications

Internal applications

B2B applications

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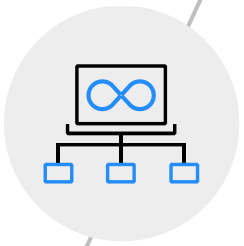
Customer experience is crucial

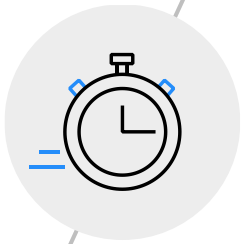
*"More than any other factor, customer experiences determine whether companies thrive and profit, or struggle and fade"**

Your end users have high expectations

Personalisation
38% will not come back if they have to repeat themselves



Cross-device
65% get frustrated with an inconsistent experience



Speed
79% will not return to a slow website

*Source: Forrester Research, "Outside In"

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Modern web applications challenges

- Fast, fluid, and reliable experience
- Intelligent customisation
- Quick functionality and content updates
- Authentication and identity, sensitive data handling
- Cross-platform engagement
- New ways to interact with customers

Scalable Web Applications with Azure Services

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What are you going to learn?

- What is web application scalability?
- Why is it essential?
- What are two main ways to scale?
- Why should you design to scale out?
- Real-world scenario.
- Some Azure cloud services.

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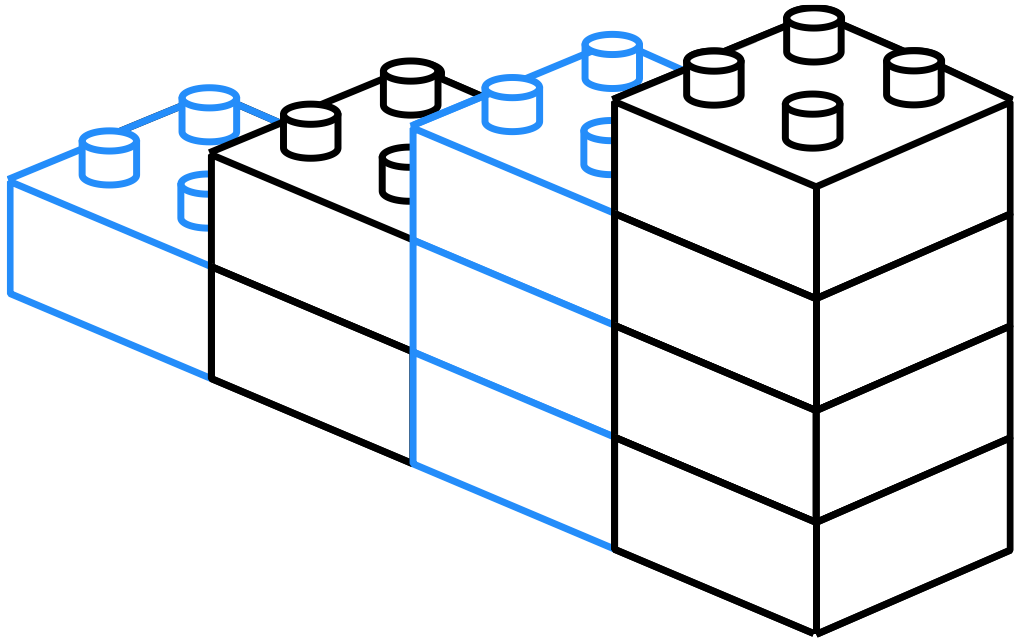
What is scalability?

Ability to handle increased load

Add resources without modifying the system



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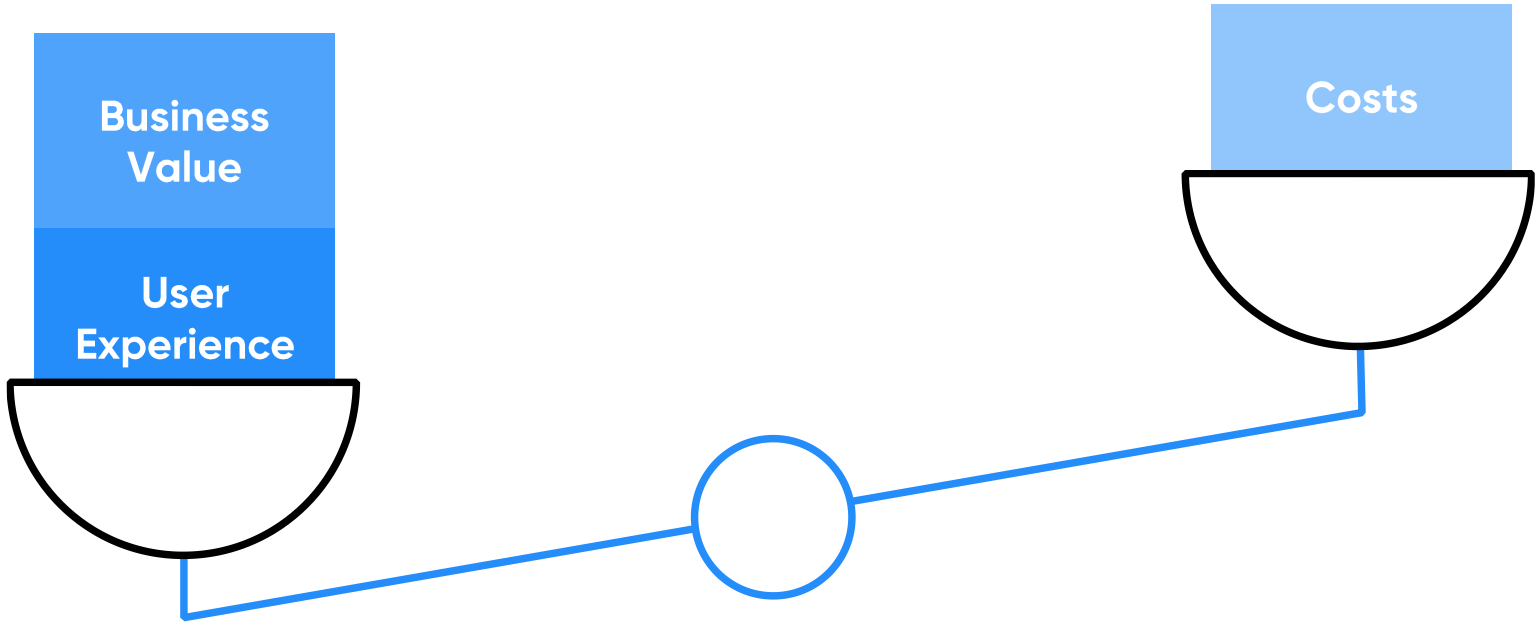
Scalability, why should you care?



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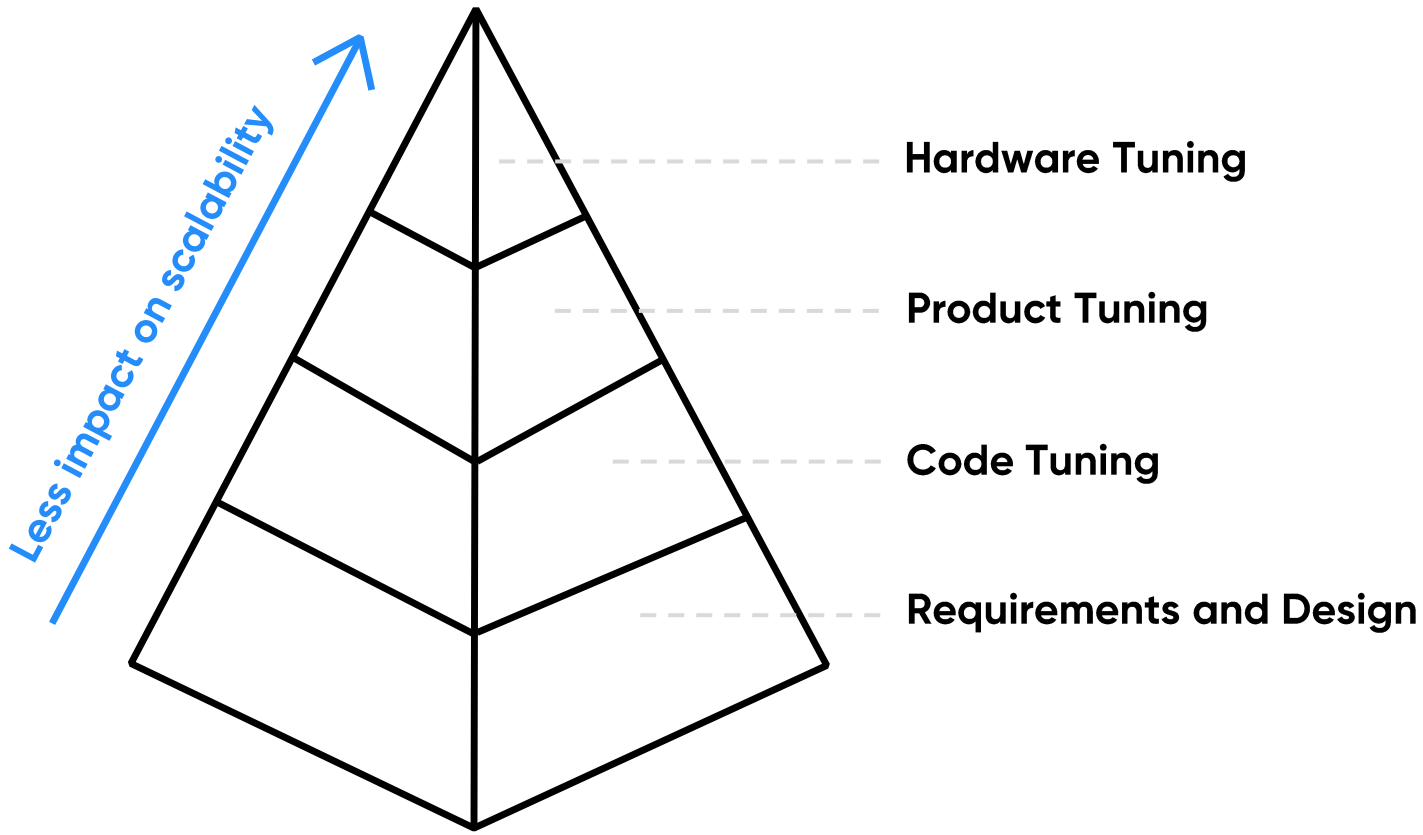
Impact on scalability

The Scalability Pyramid



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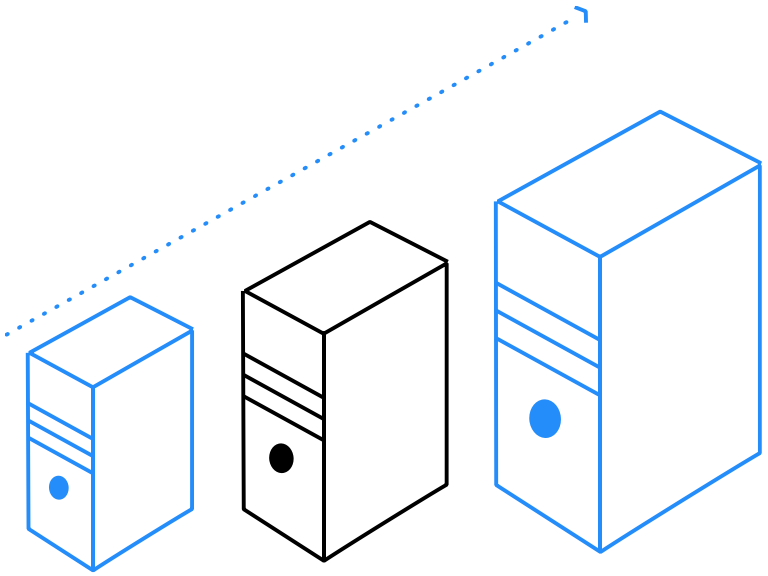
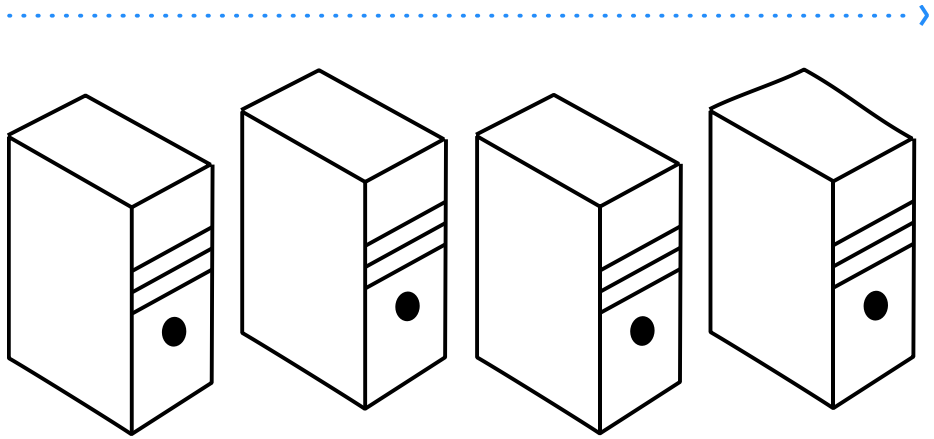
Two methods to scale



Scale Up (vertical scaling)
Increase capacity by adding RAM/CPU
Disk to a single resources



Scale Out (horizontal scaling)
Increase capacity by adding resources

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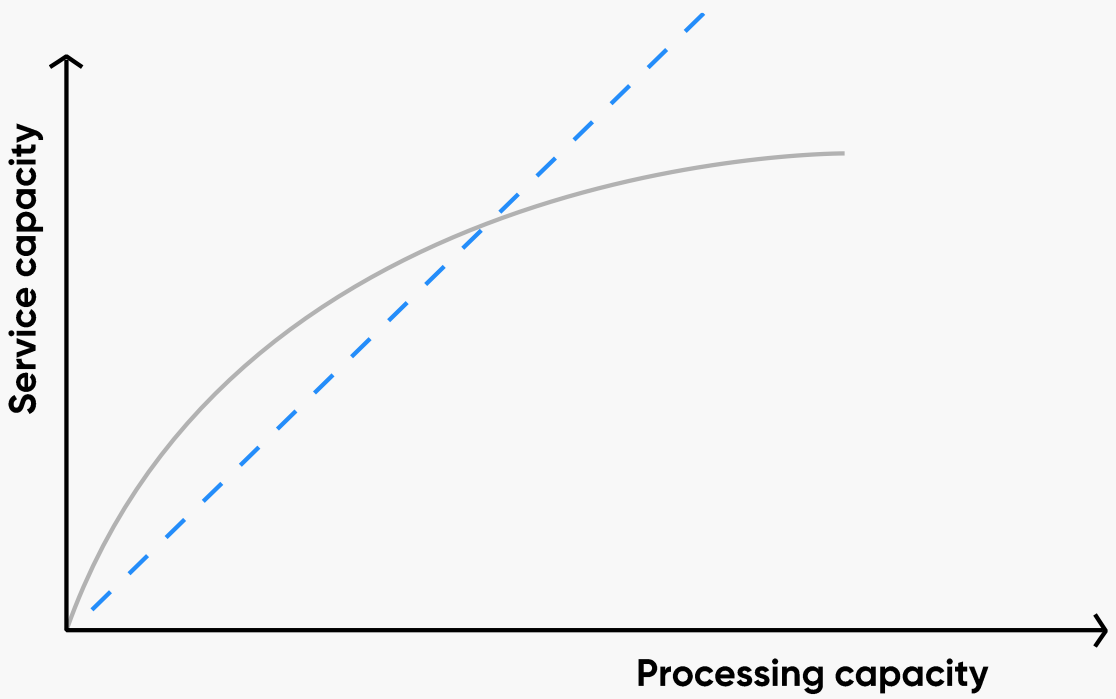
Scaling up

- Application does not have to be designed for scalability;
- Easy to implement;
- Costly;
- Not linear performance growth;
- Has upper scalability limit.



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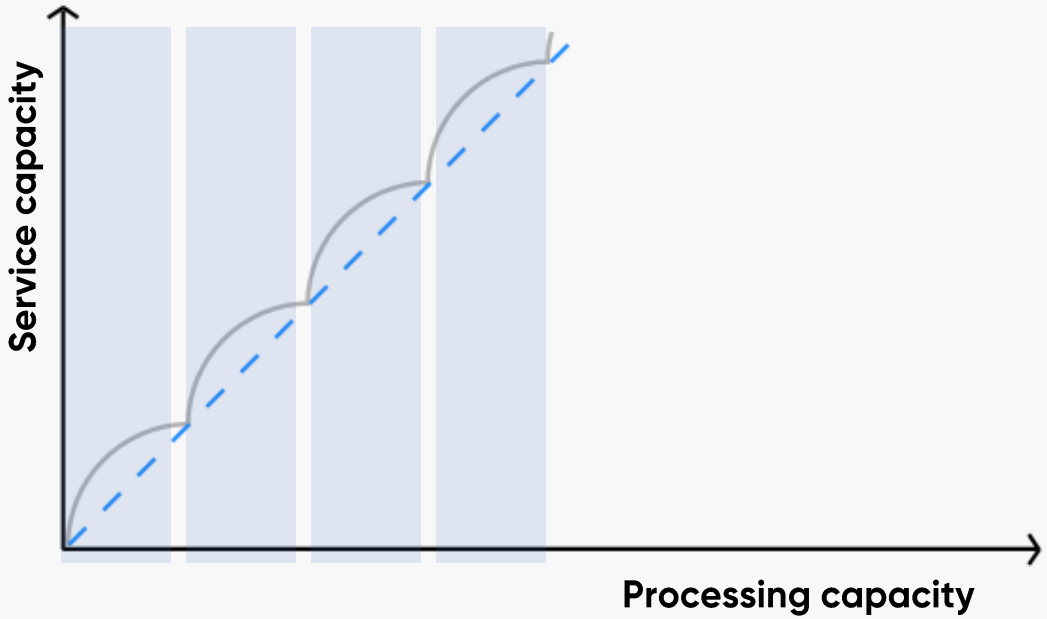
Scaling Out

- Application has to be designed for horizontal scalability;
- Requires more investment to implement;
- Introduces additional complexity;
- Nearly linear performance increase.



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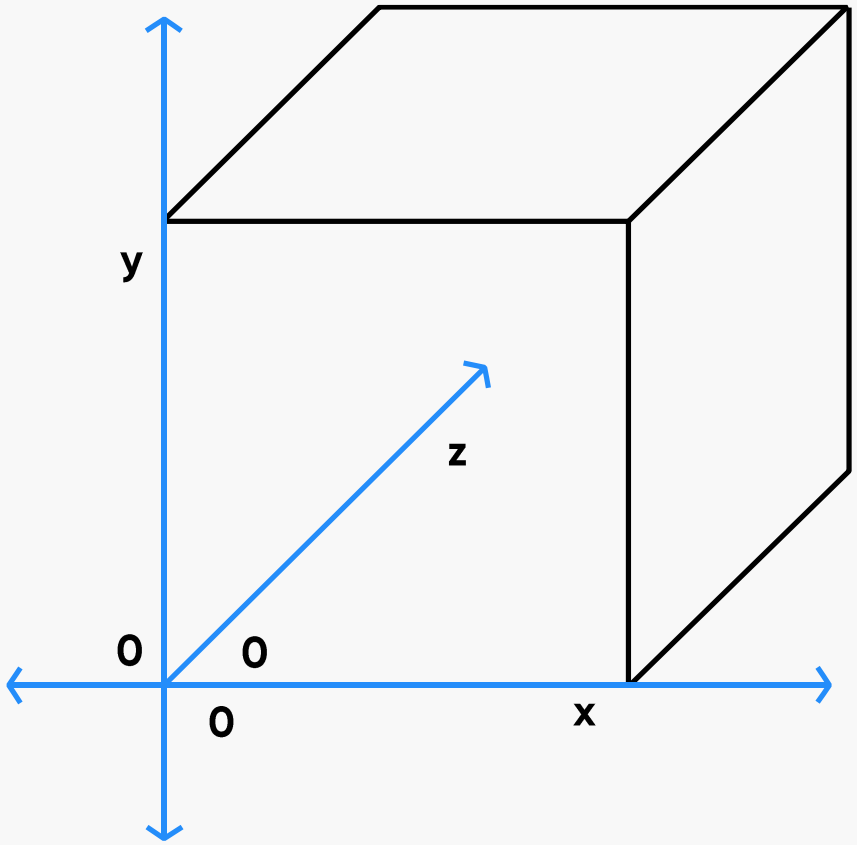
Scale Cube

- Model that allows thinking in terms of scalability;
- X-axis split: cloning or duplication;
- Y-axis split: functional decomposition;
- Z-axis split: segmentation or partitioning



Scale Cube described by Martin Abbot and Michael Fisher in the "Art of scalability"

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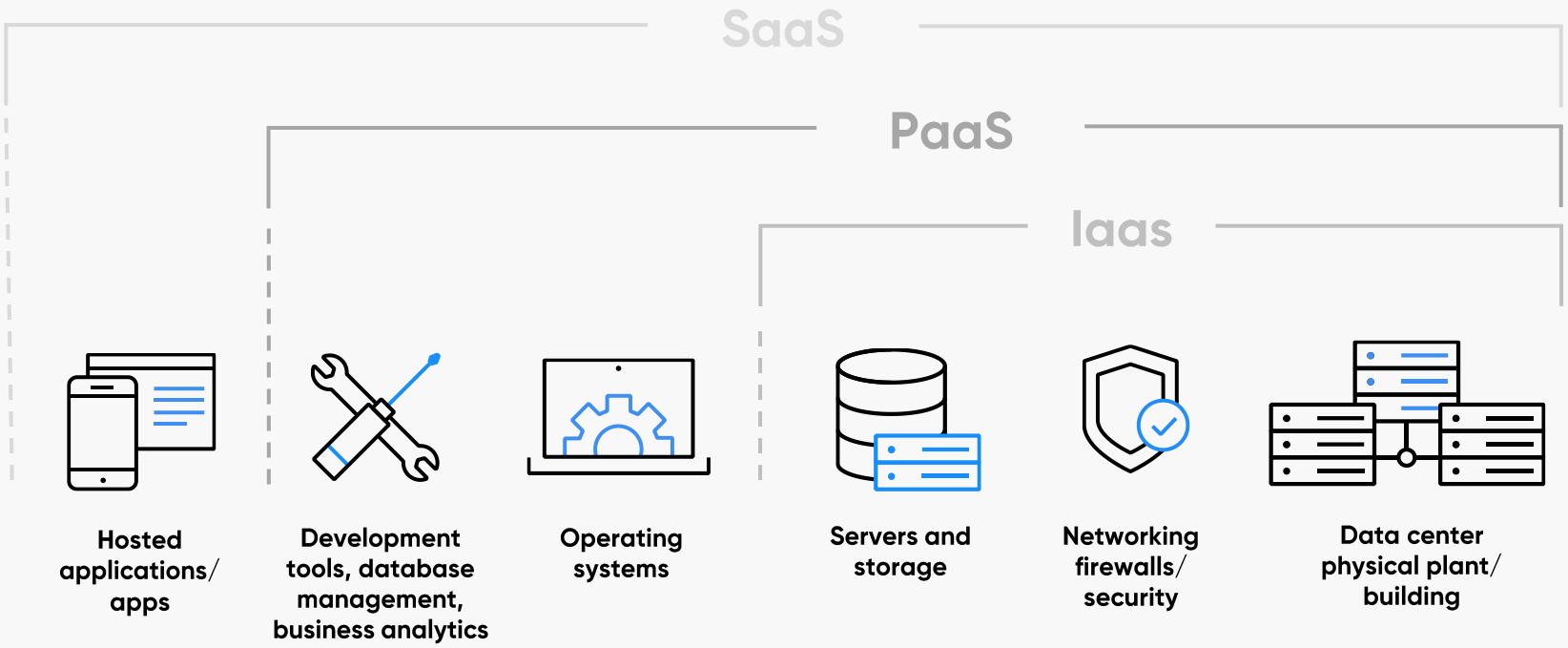
Azure



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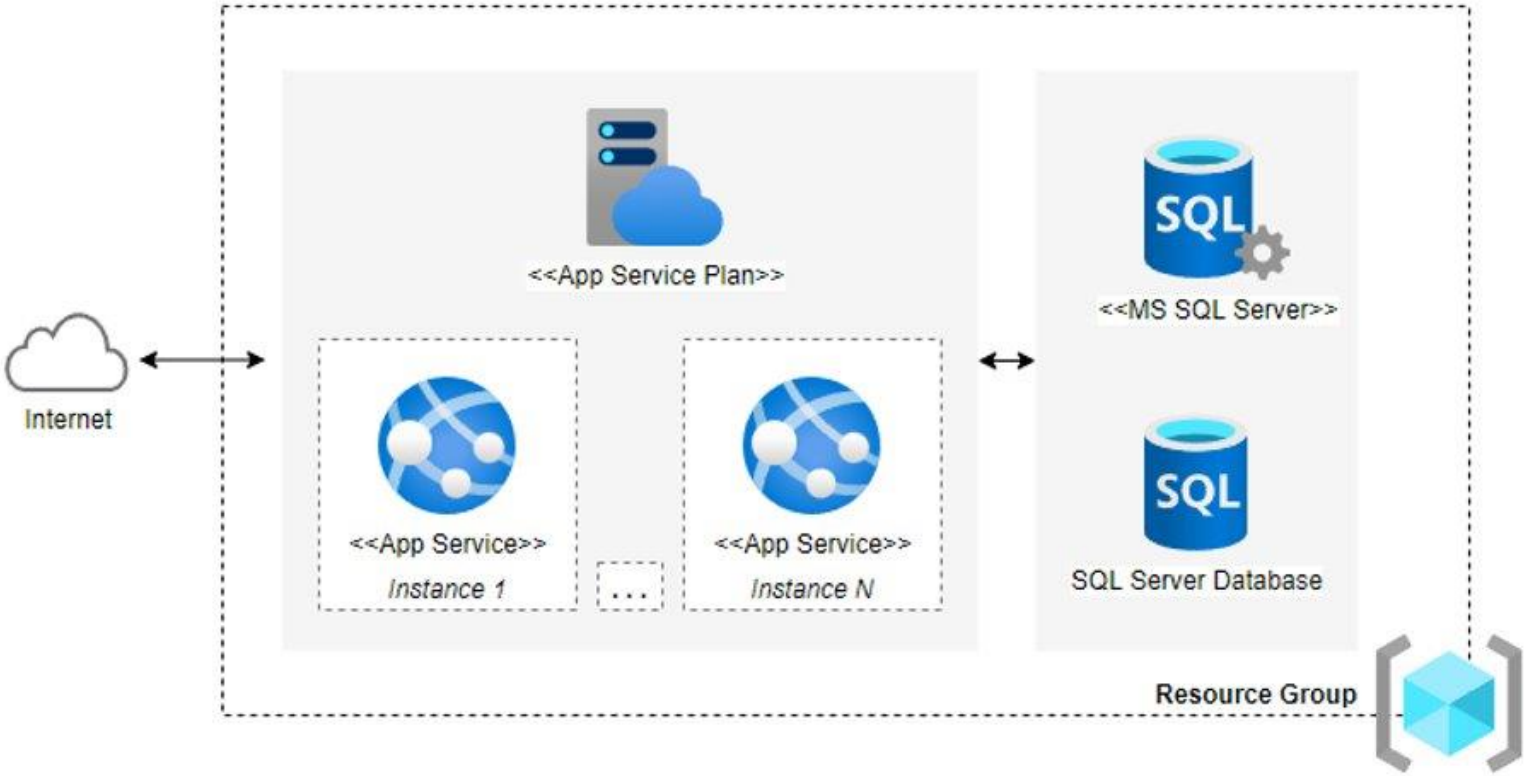
Initial Architecture



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As Is

- Monolith MVC application;
- Hosted as Azure App service;
- X-axis split achieved with App Services multiple instances and enabling session affinity;
- Connected to a single MS SQL Relational Database.

Problems

- Session affinity is not optimal for load balancing;
- Single application quickly gets very complex as the code base grows;
- Single database eventually will become a bottleneck even though the application is scaled out.

To Be

- Introduced Y-axis split of application to:
- get rid of session affinity,
- reduce code complexity,
- and introduce fault isolative architecture.

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Azure App Services

Azure App Services is a cloud computing-based platform for hosting websites

App Service

- App Service Plan
- App Service
- Web App
- API App
- Mobile App

Scaling

- Scale Up
- Scale Out
- Auto Scaling
- Global Scaling with Azure Traffic Manager (Front Door)

Tiers

- Free
- Shared
- Dedicated (basic, standard)
- Isolated (ASE)

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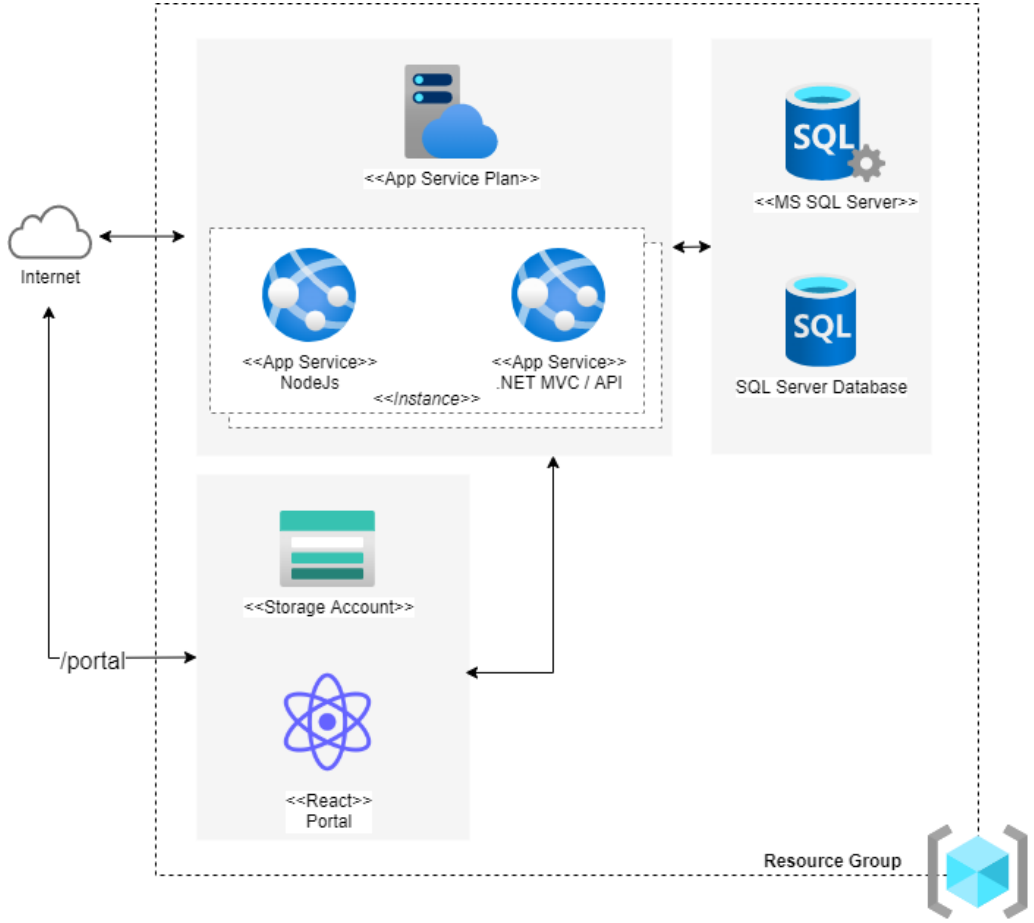
First Y-axis Split

As Is

- Application split into Admin, Portal, and Site applications;
- The portal React application is hosted in a massively scalable **Storage Account** service.

Problems

- Application split into Admin, Portal, and Site applications;
- The portal React application hosted in a massively scalable Storage Account service.



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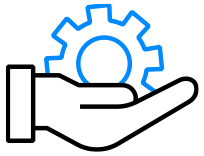
Azure Storage Account

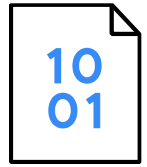
Storage Account

- Cloud repository for data
- Enormously scalable
- CORS support
- Role-based access control



Services

- Azure Blob
- Azure Files
- Azure Queue Storage
- Azure Table Storage
- Azure Disk Storage



Azure Blob Storage

- Azure Blob storage is an object storage
- Blob storage objects can be accessed HTTP/HTTPS
- We used Blob Storage for Storing React application for distributed access

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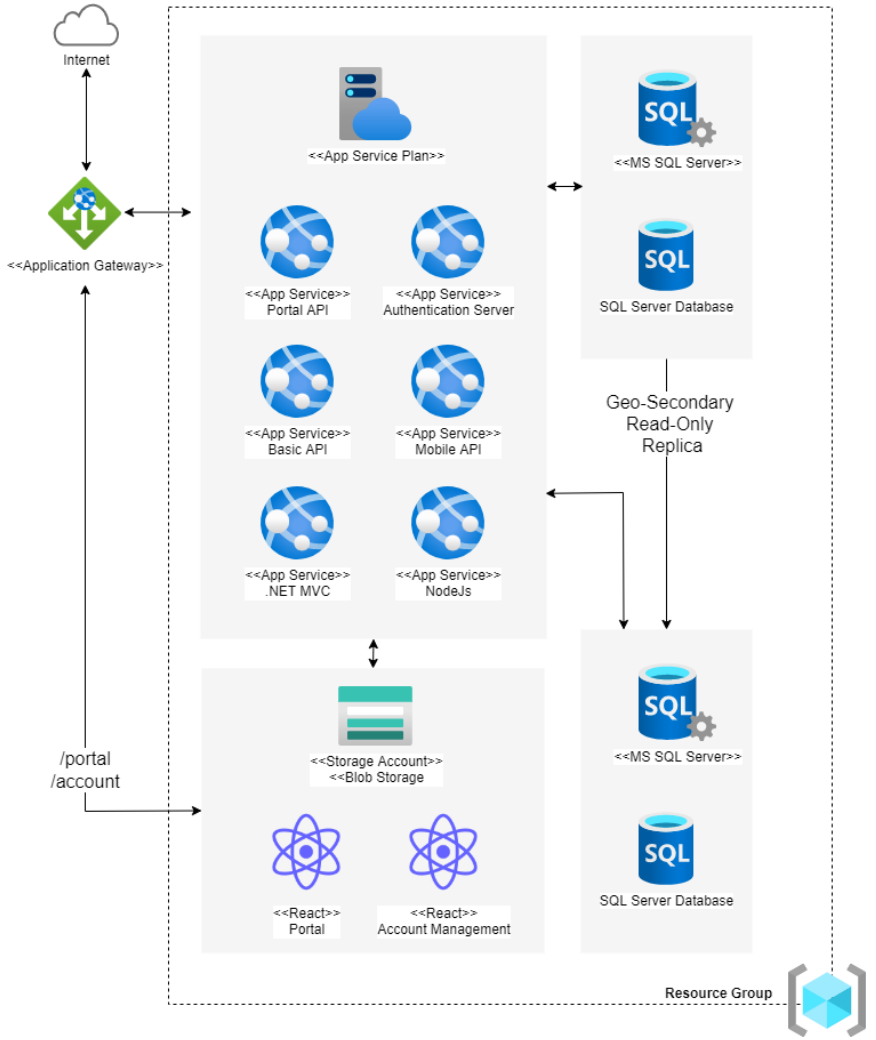
Database Replica

As Is

- Business logic decomposed to separate applications and exposed through REST API;
- Presentation separated from business logic with SPA application;
- Secondary Replica created as Read-Only database to balance transactions and create the geographic failover.

Opportunities

- Asynchronous and performance demanding tasks could be implemented separately from the application with Azure Functions;
- Data could be partitioned to increase performance.



Azure SQL Database

- Azure SQL Database is a fully managed platform as a service (PaaS) database engine;
- Has many Enterprise features: for example, Column Store index;
- You can dynamically scale single database resources up and down;
- The serverless computer is available. Automatically scales compute based on workload demand;
- The single database allows you to configure up to four readable secondary databases in either the same or globally distributed Azure data centers.

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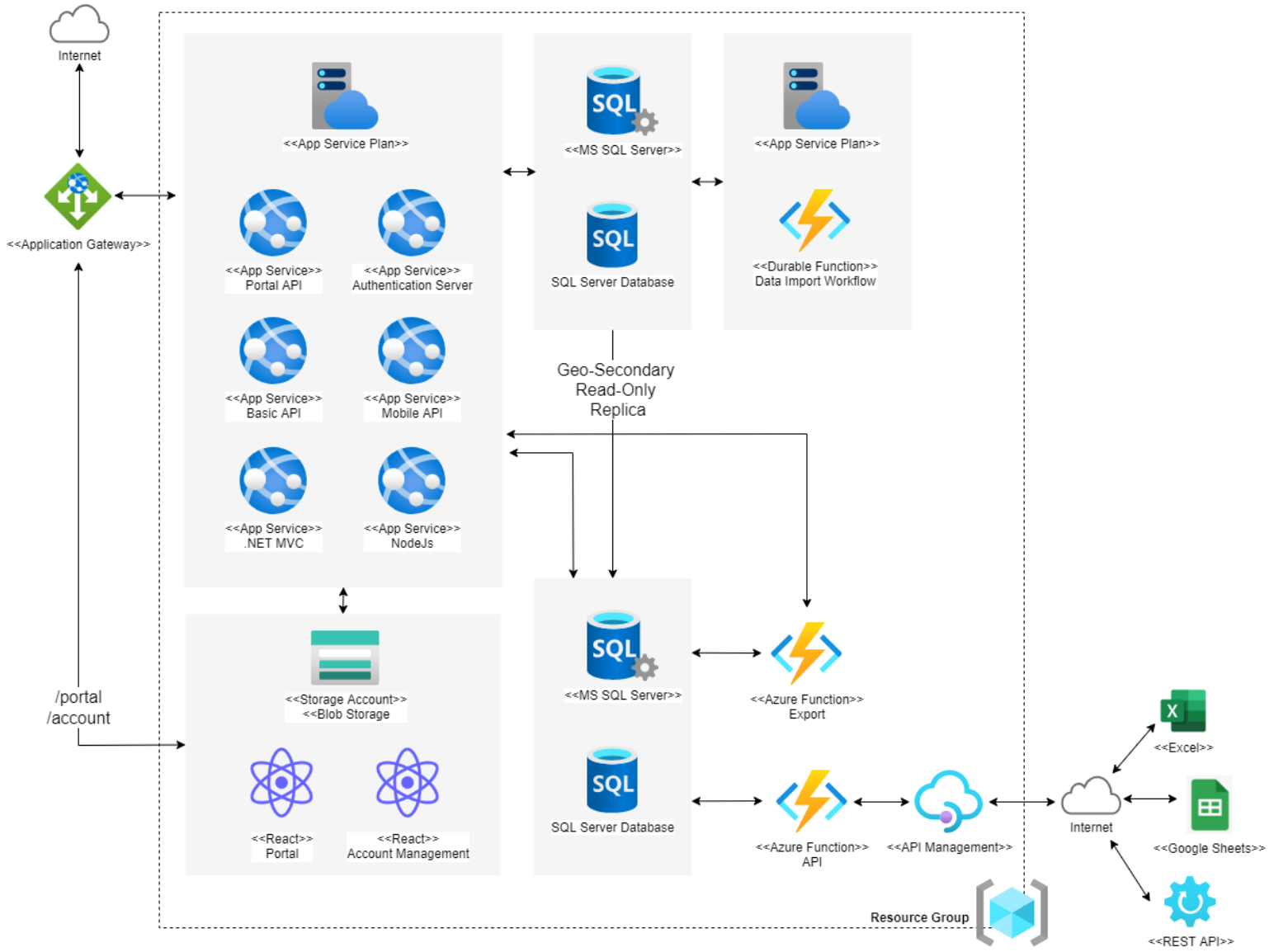
Current Architecture



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Azure Functions

- Azure Functions is a serverless solution that allows to write less code, maintain less infrastructure, and save on costs;
- The Consumption plan scales automatically, even during periods of high load;
- On a consumption plan instances of function hosts are dynamically added and removed based on the workload for functions;
- For long running workflows Durable Azure Functions are recommended.

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Techologies

API Management

Azure Fuction

Application Gateway

App Service

SQL Server Database

Storage Account

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Alternatives

Azure Static Web Apps is a service that automatically builds and deploys full stack web apps to Azure from a code repository.

Azure Container Apps is a fully managed serverless container service for building and deploying modern apps at scale.

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What benefits do customers get?

Flexible and modern architecture

Fast implementation

Easier expansion

Enhanced solution security and maintainability

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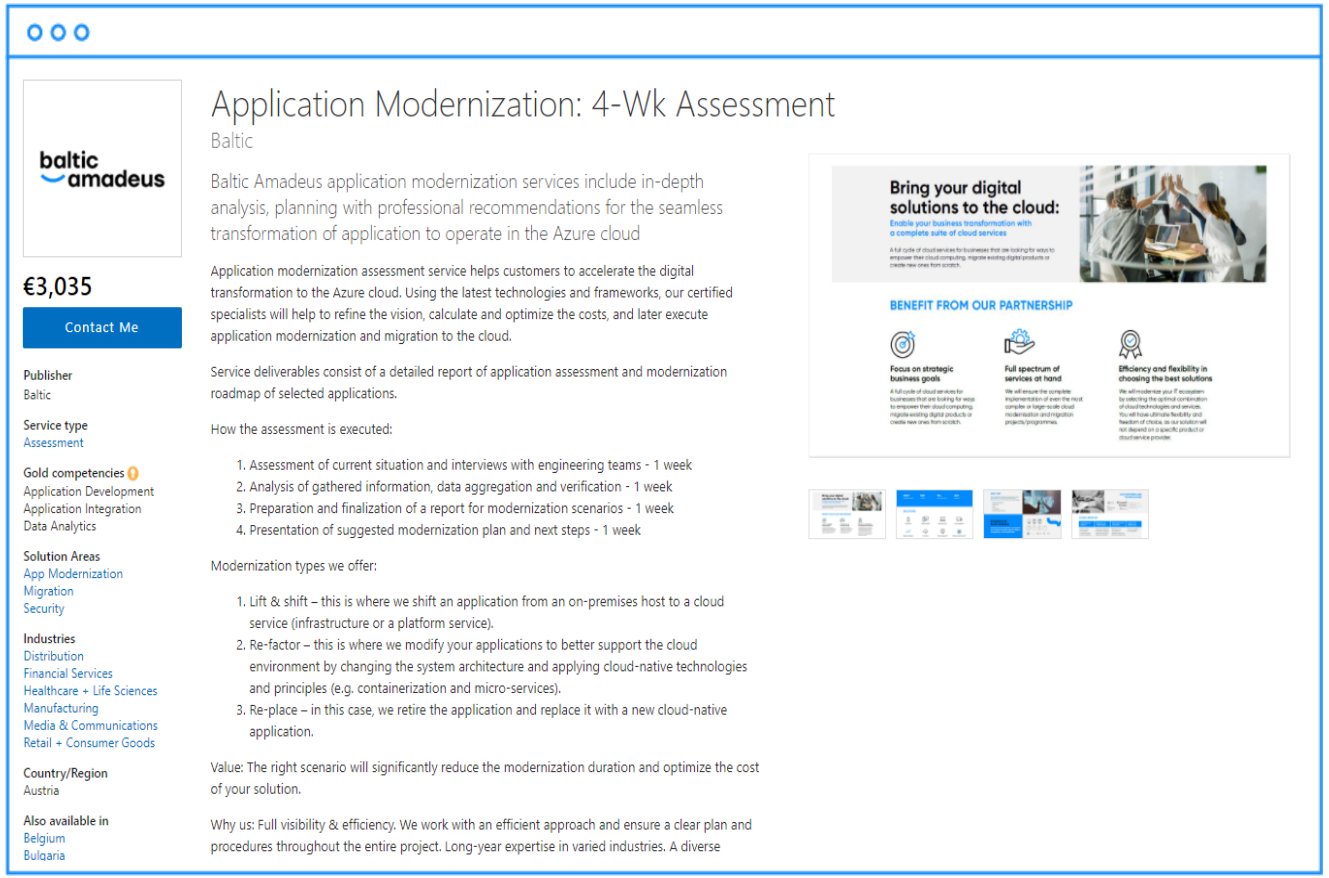

Available on
Microsoft Azure
Marketplace

- Application Modernisation: 4Wk Assessment
- Building Cloud Native Apps: 1-Day Workshop
- BI & Data Warehouse: 4-Wk Assessment
- Data Analytics Solution: 1-Mo implementation

Time for your questions

Q&A SESSION