

# Challenges of moving from single tenant to multi-tenant application architecture



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Chief Architect

# Our Business Solutions



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## Core EMS

Large infrastructure  
IoT integration  
Single customer

## EMS for Energy Audit

Energy Audit  
Compliance with MEKH  
Multi-tenant

## EMS for SCADA

Complete remote control  
Dumb and smart sensors  
Intelligent infrastructure

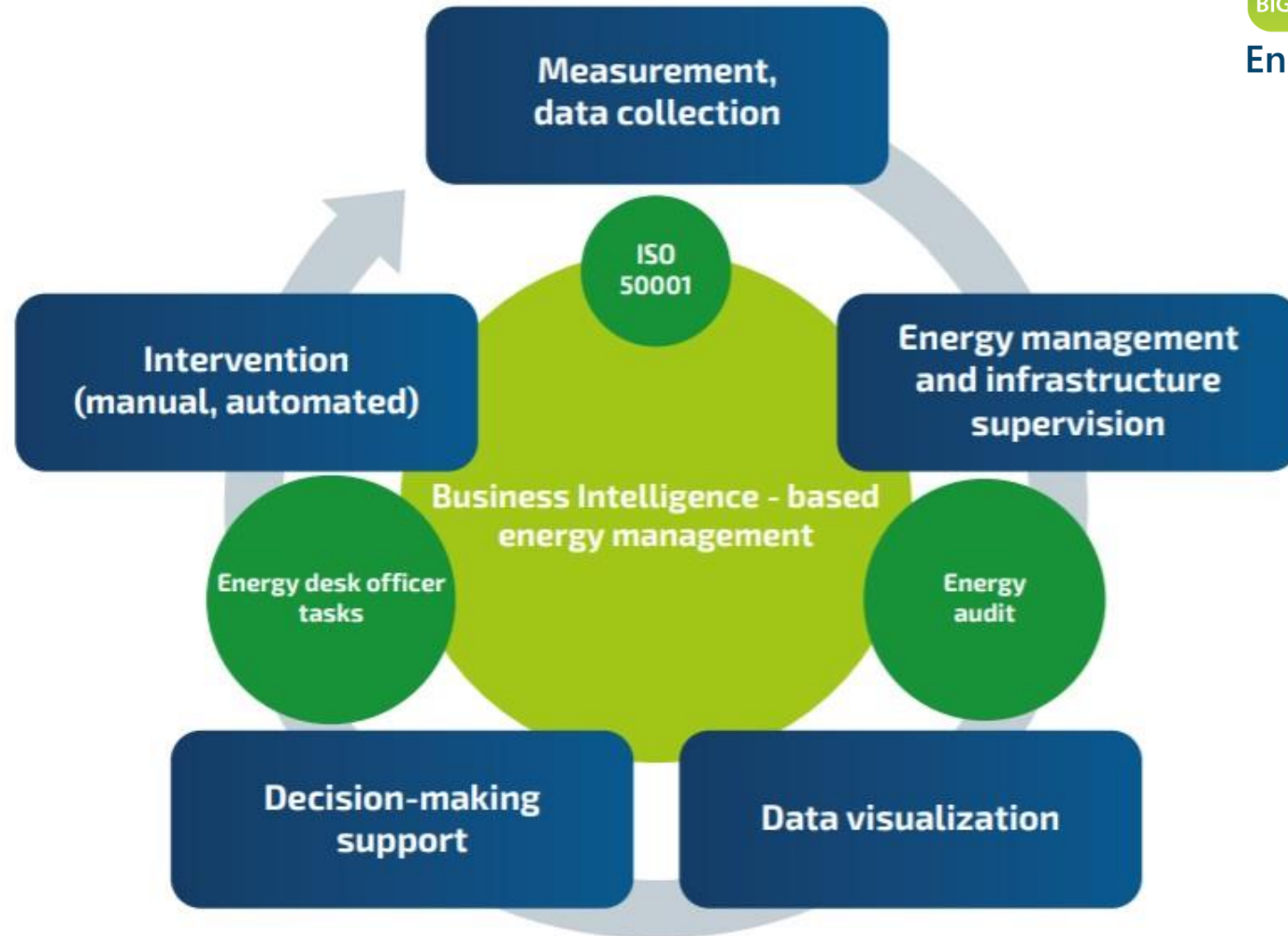
Magyar  
Telekom 

 Systems



 powered by  and 

# Our solution



Processes of modern energy management systems

## Our solution

### Power Quality Analyzer (PQA) Device Family

- Self-developed hardware
- Easy and interruption free installation
- High accuracy measurements with remote, adjustable configuration
- Multiple sizes for specific needs and location
- Supported networking protocols: GSM, WiFi, Ethernet, LoRa
- Warnings and controller feature
- External sensor connectivity

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# Business Value



**Cost-efficiency**



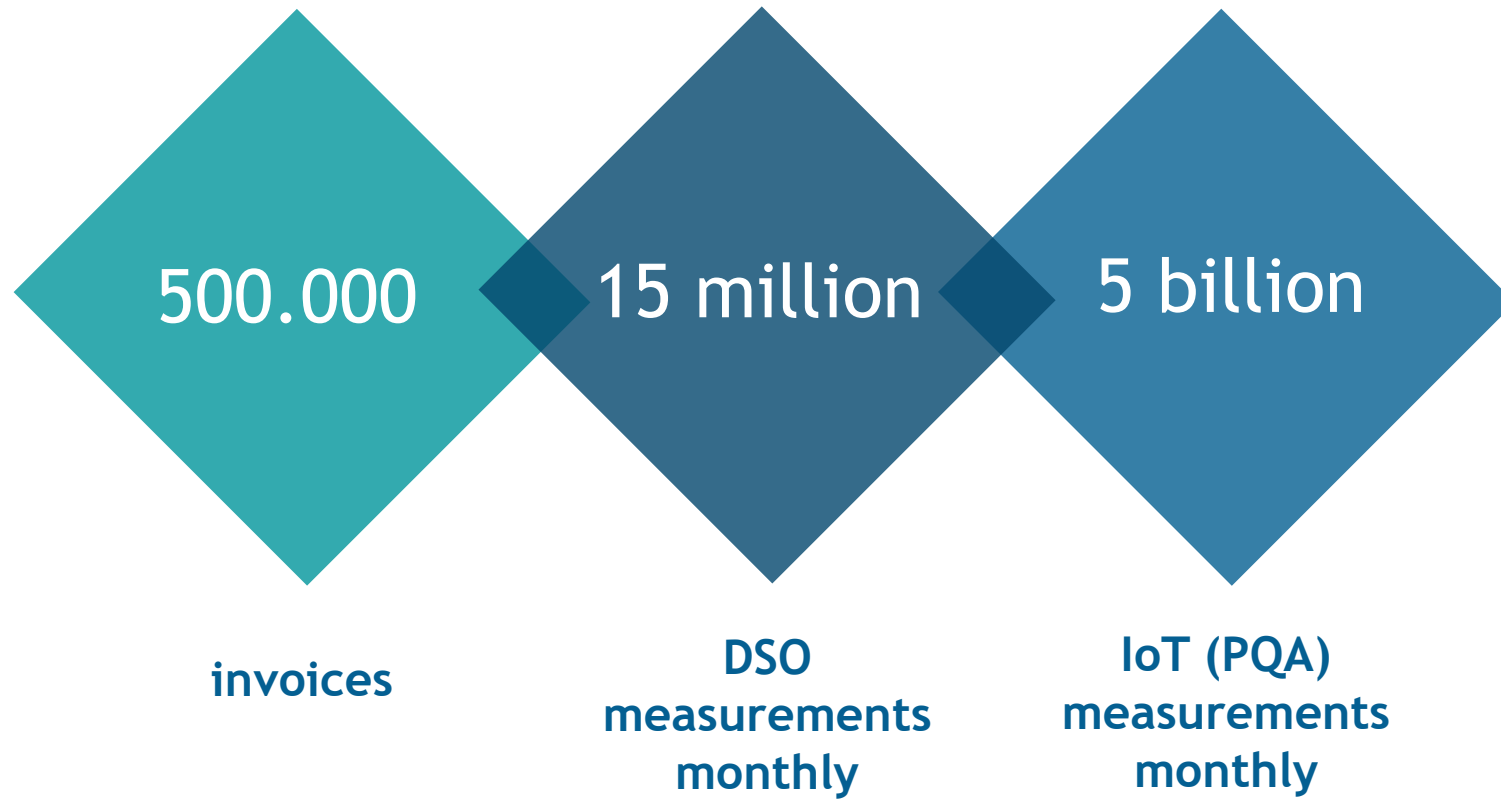
**Time-efficiency**



**Energy-efficiency**

ADAPT | INNOVATE | IMPROVE

# EMS in numbers



EMERSON SOFTWARE PARTNERSHIP

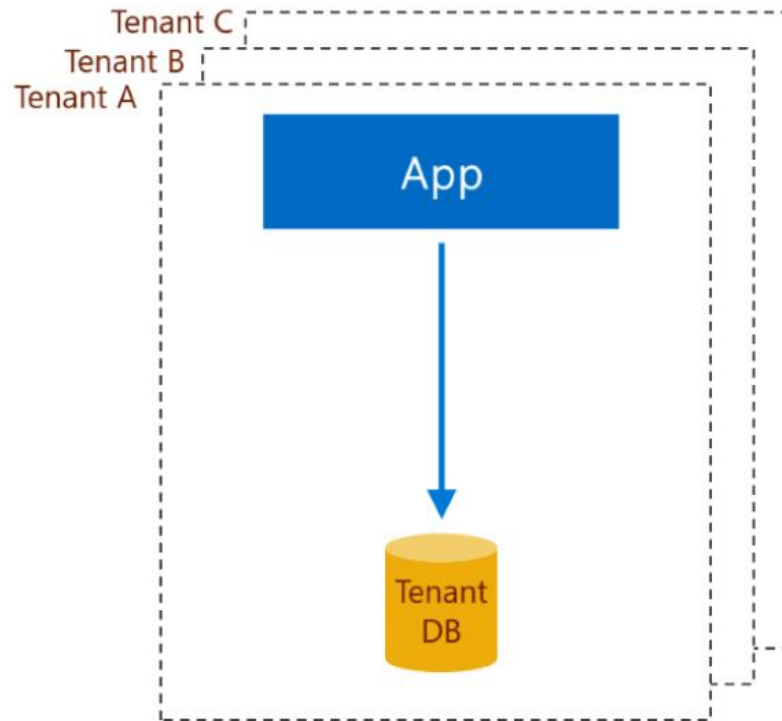
## Current Infrastructure

- AWS
- Angular
- Python
- Kubernetes
- Qlik Sense
- Amazon RDS and Aurora





# Single Tenant



Optional tenant catalog, used to manage database connections in cross-tenant scenarios only.

Image courtesy of Microsoft

# Challenges

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Cost-effective  
infrastructure scaling

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Initial implementation and  
operational requirements

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Code and object model  
standardization

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Data boom

# Multi-tenant app with stand-alone database per tenant

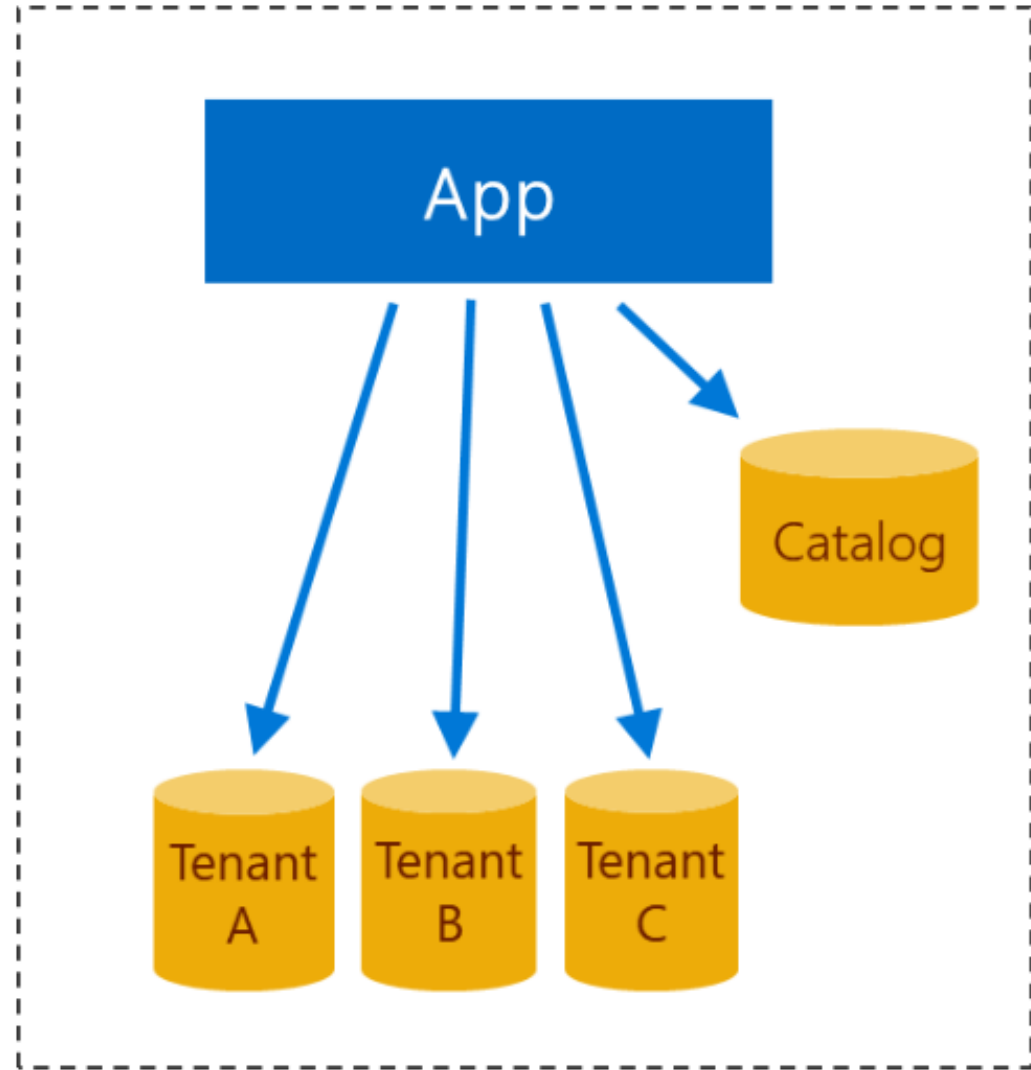


Image courtesy of Microsoft

# Multi-tenant app with sharded multi-tenant database

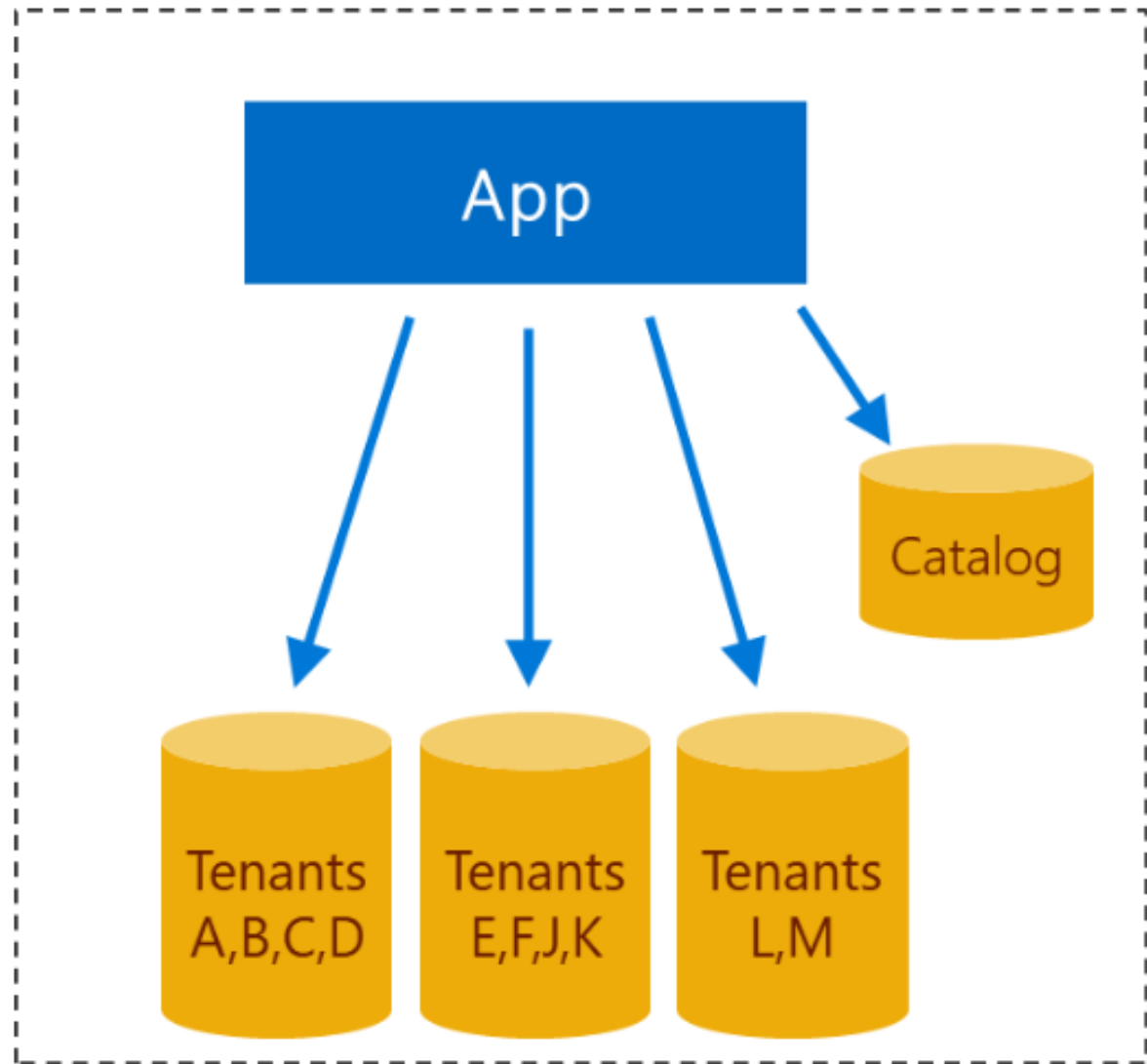


Image courtesy of Microsoft

# Development Goals

Lower  
implementation  
cost and turn-  
over

Standardize  
components  
from different  
infrastructures

Complete  
multi-tenancy

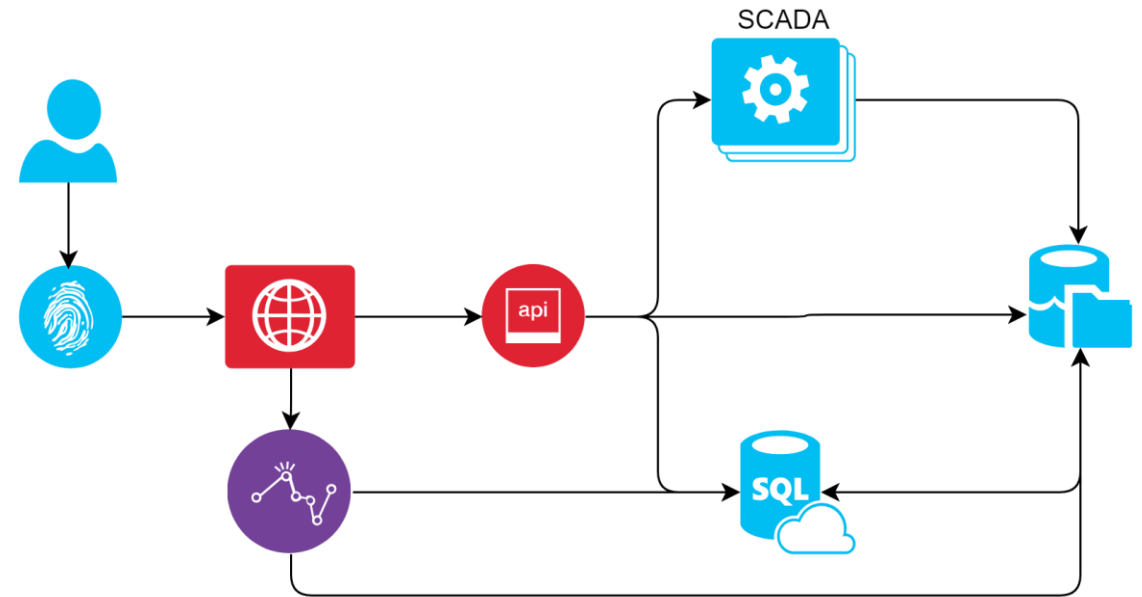
Adapt to  
exponential  
growth of IoT  
devices

Edge computing

Lower IaaS  
elements

# Architectural Objectives

- Isolation of core modules
  - Identity Management
  - Web App
  - SCADA
  - Object Model (Relational and NoSQL)
  - Business Intelligence and Analytics
- Eliminate root servers and VMs
- Complete multi-tenancy
- Open APIs for integration
- Autoscaling of resources



Application Design

# Scalability

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Component-level scaling

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Shared or isolated resources

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Load leveling

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Lower operational complexity

# Architectural Challenges

## Resiliency

- Geo-redundancy
- Clustering and self-healing
- Caching
- Disaster Recovery

## Performance

- Autoscaling
- Load balancing
- Caching
- CQRS



## Planned Technologies

- Azure
  - Functions
  - SQL Elastic Pools
  - CosmosDB
  - Data Lake
  - Kubernetes Service
  - Service Bus
- Apache NiFi
- New BI solution



## Comprehensive Software as a Service solution

Scalability

3 systems integration

Dumb sensor connectivity

Complete cost-effective  
infrastructure management





Thanks for your attention!

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