



ArchitectNow

WORKSHOP:

**Building Resilient Cloud
Applications – Exploring
Modern Cloud Designs**

PRESENTED BY

**Alex Will &
Kevin Grossnicklaus**

info@architectnow.net

www.architectnow.net



ArchitectNow

TRANSFORMATION THROUGH TECHNOLOGY

WELCOME TO **ARCHITECTNOW**

Whether launching new Cloud or mobile apps or modernizing your legacy platforms we can help you identify the best options and work with you on bringing those ideas to life. To get the ball rolling, reach out and tell us a bit about your needs and we can start identifying solutions. There is no risk and we can quickly get to the point of providing initial ideas along with rough estimates of the costs and implementation times required with various recommendations.

info@architectnow.net
www.architectnow.net



CONTACT INFORMATION

Kevin Grossnicklaus

President

ArchitectNow

kvgros@architectnow.net

[LinkedIn](#)

[@kvgros](#)

Alex Will

Chief Technology Officer

ArchitectNow

awill@architectnow.net

[LinkedIn](#)

[YouTube](#)

[@alwill_dotnet](#)

www.ArchitectNow.net

[@architectnow](#)

[LinkedIn](#)

EXPECTATIONS AND AGENDA

- Agenda
 - Intro
 - Basics
 - Event Driven Design
 - Data-Centric
 - Serverless
 - Low Code/No Code
 - Microservices
 - Best Practices
 - Case Study
 - Q&A/Conclusion



What are we going to discuss?

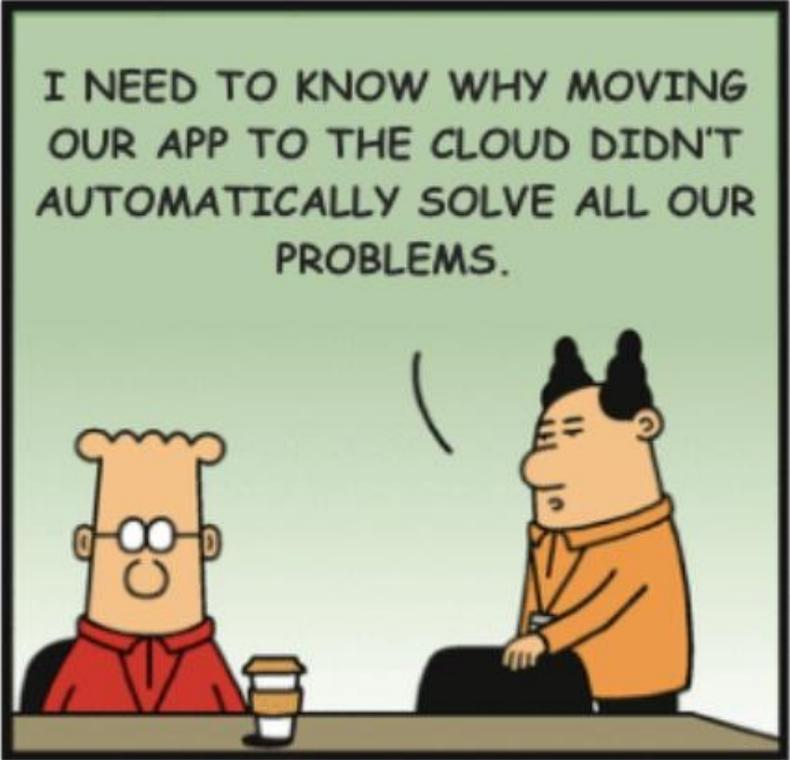
How deep are we going?



How can I get help and advice?

Are you going to focus on the “why” or the “how” to move to Azure?

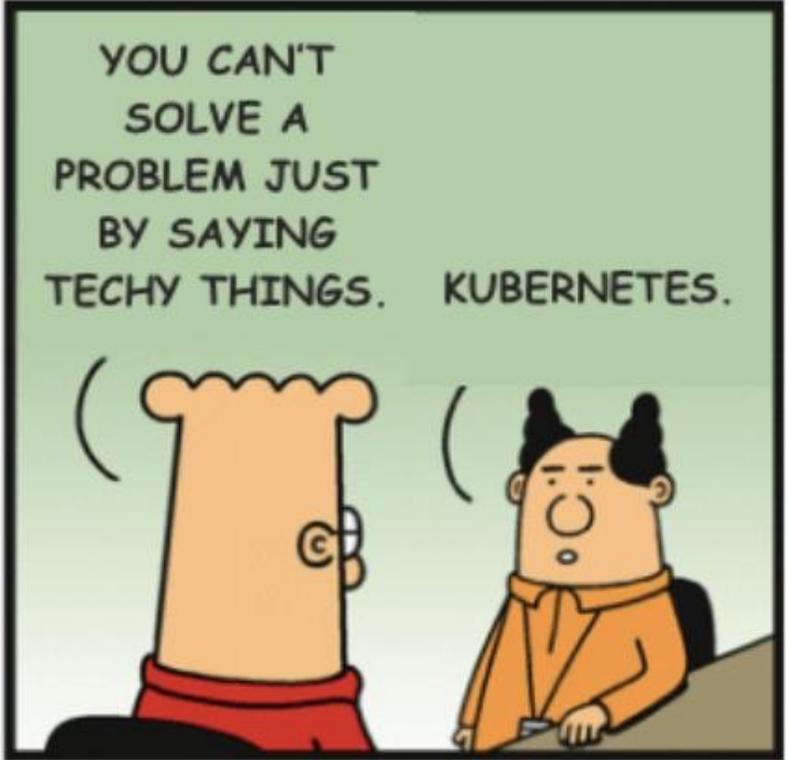




Dilbert.com @ScottAdamsSays



11-08-17 © 2017 Scott Adams, Inc./Dist. by Andrews McMeel



Introduction

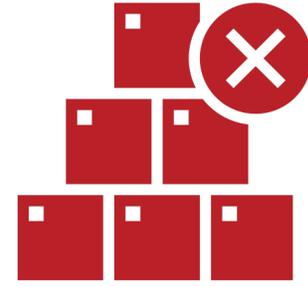


What do we consider “Legacy”?



What do we consider “Cloud Native”?

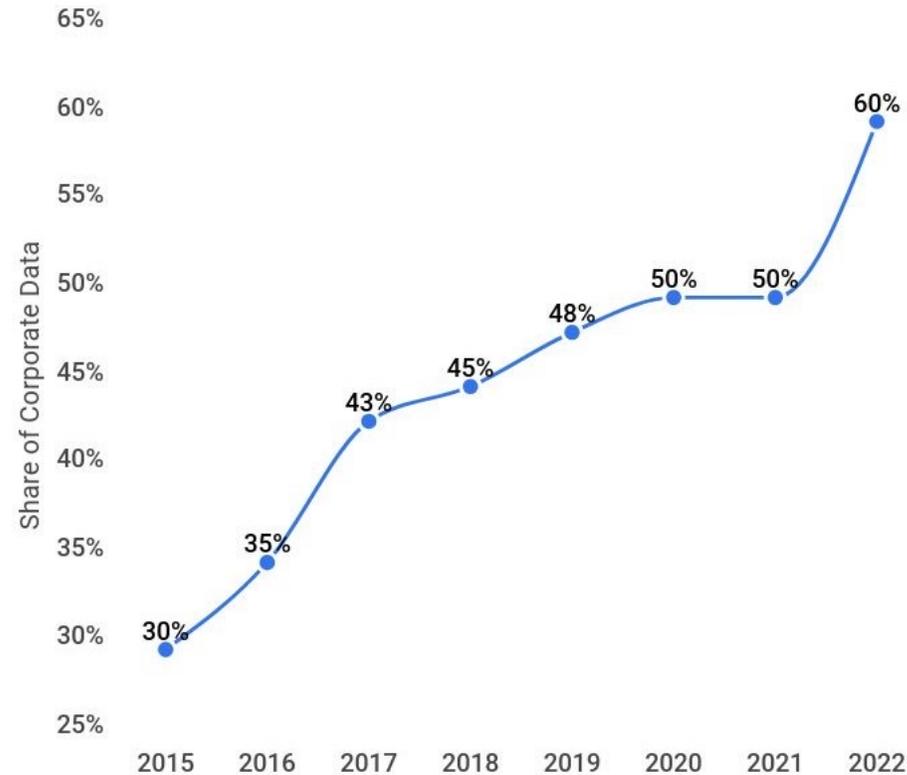
Why Cloud Computing?



- More tools
- Faster to fail and succeed
- Design for Failure
- Increase Collaboration
- Focus on what you do best

Importance of Cloud Computing

SHARE OF CORPORATE DATA STORED IN THE CLOUD OVER TIME



- Increasing demand of Cloud Knowledge
- Faster to Market time
- Spend over time not upfront
- CAPEX VS OPEX

Source: Zappia <https://www.zippia.com/advice/cloud-adoption-statistics/>

Importance of Cloud Computing



Infrastructure as a Service (IaaS)

- Give me access low level VM's and OS's and I'll handle configuring everything myself

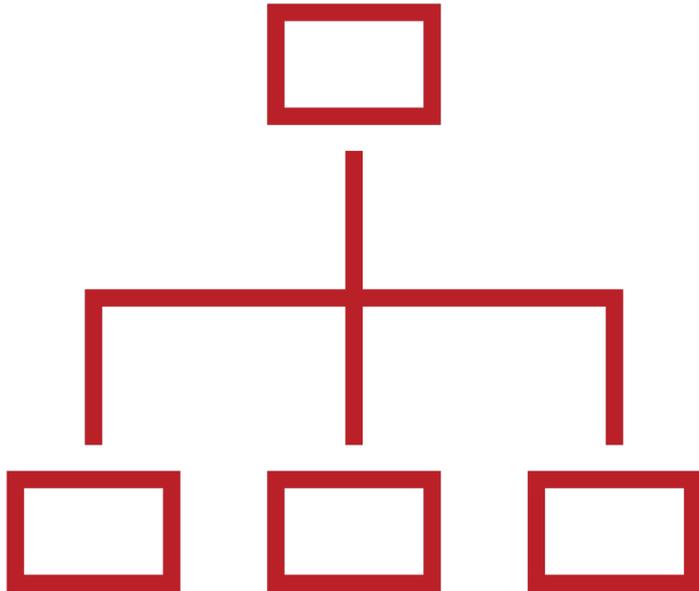
Platform as a Service (PaaS)

- I want to deploy code and let someone else handle the configuration, maintenance, and uptime of the infrastructure

Software as a Service (SaaS)

- Pre-built software or services exposed as API's for development teams to utilize

Why do we need Design Patterns?



Reliability



Security



Cost Optimization



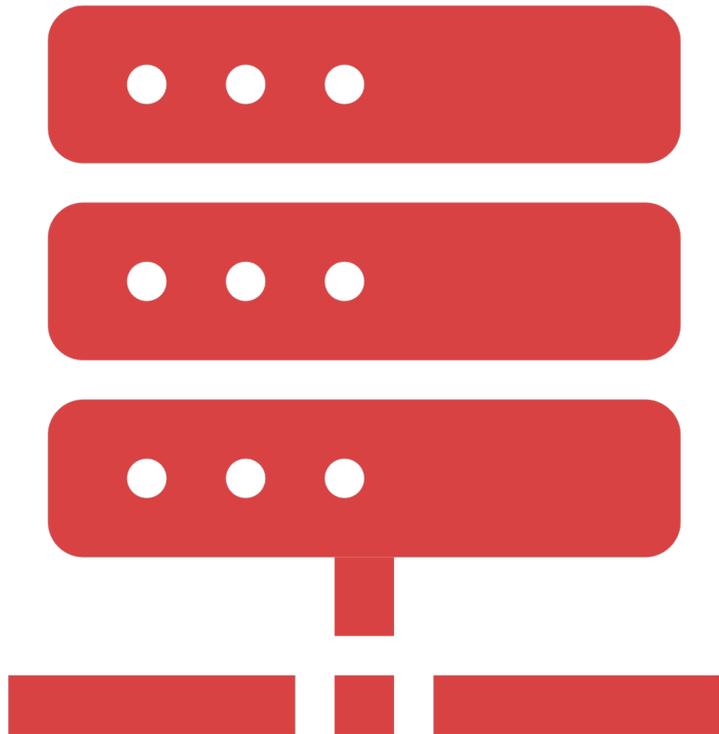
DevOps



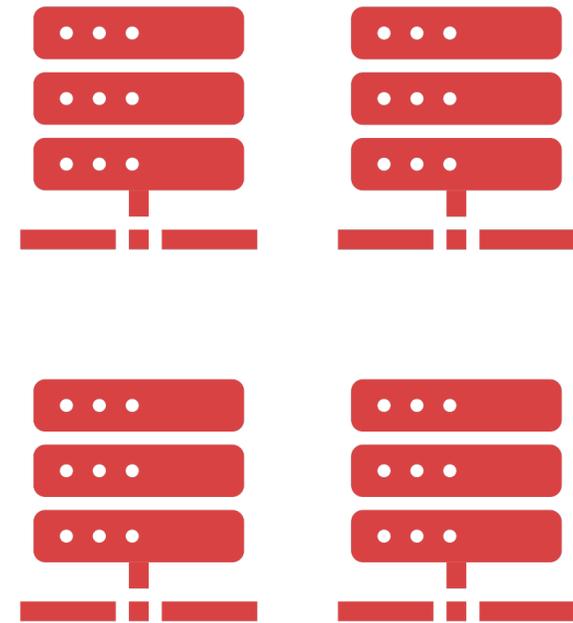
Efficiency

ARCHITECTURE AND DESIGN BASICS

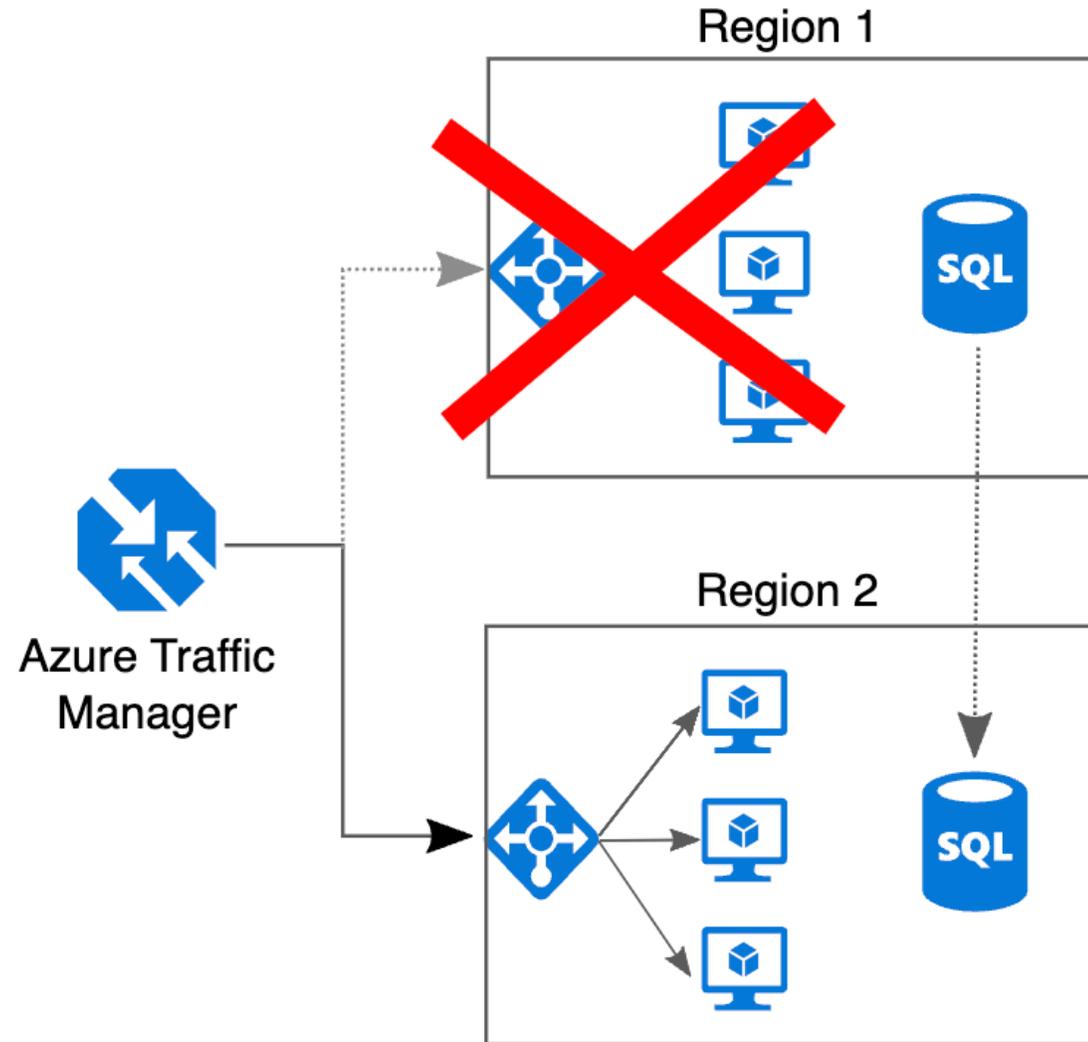
Vertical



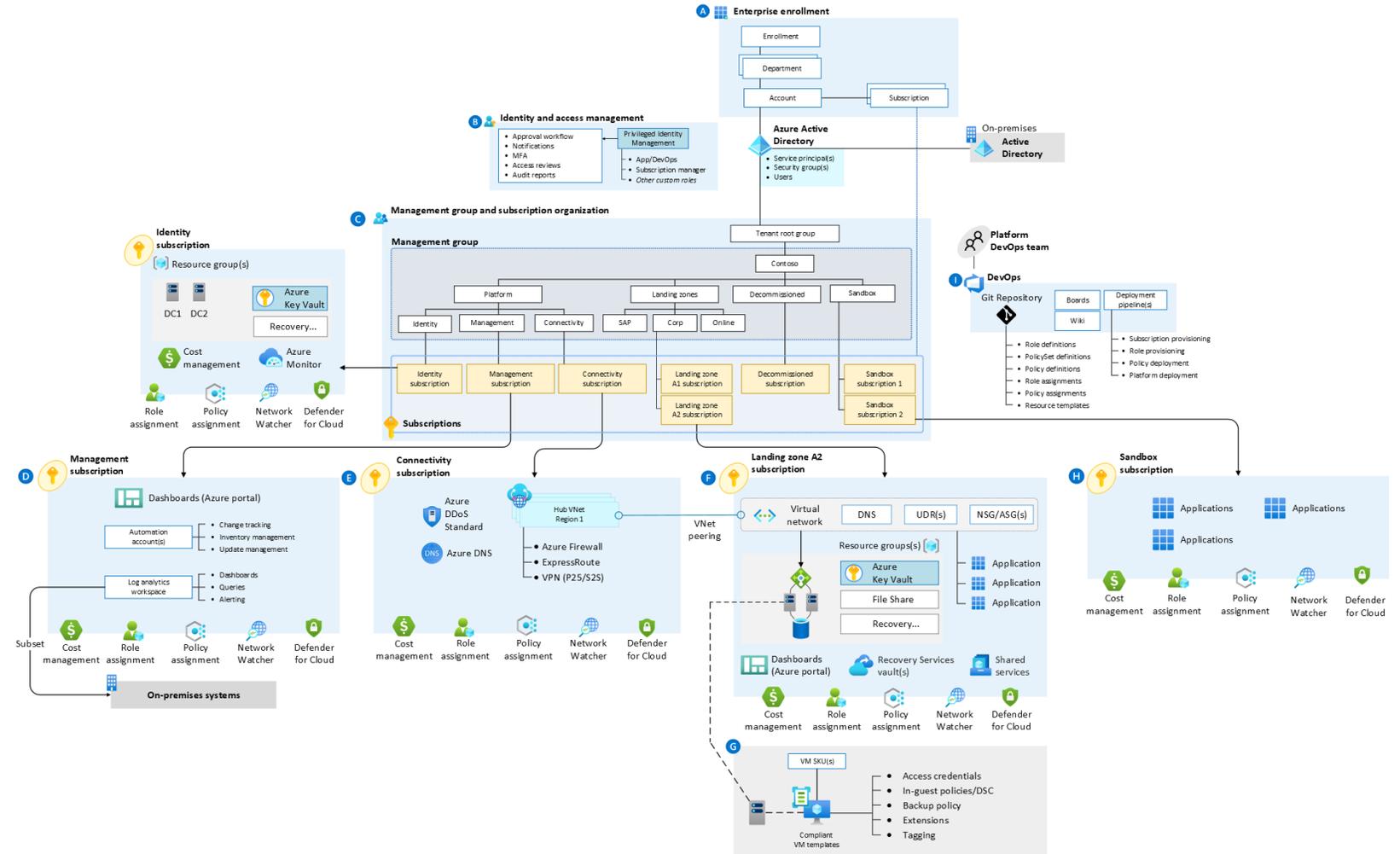
Horizontal



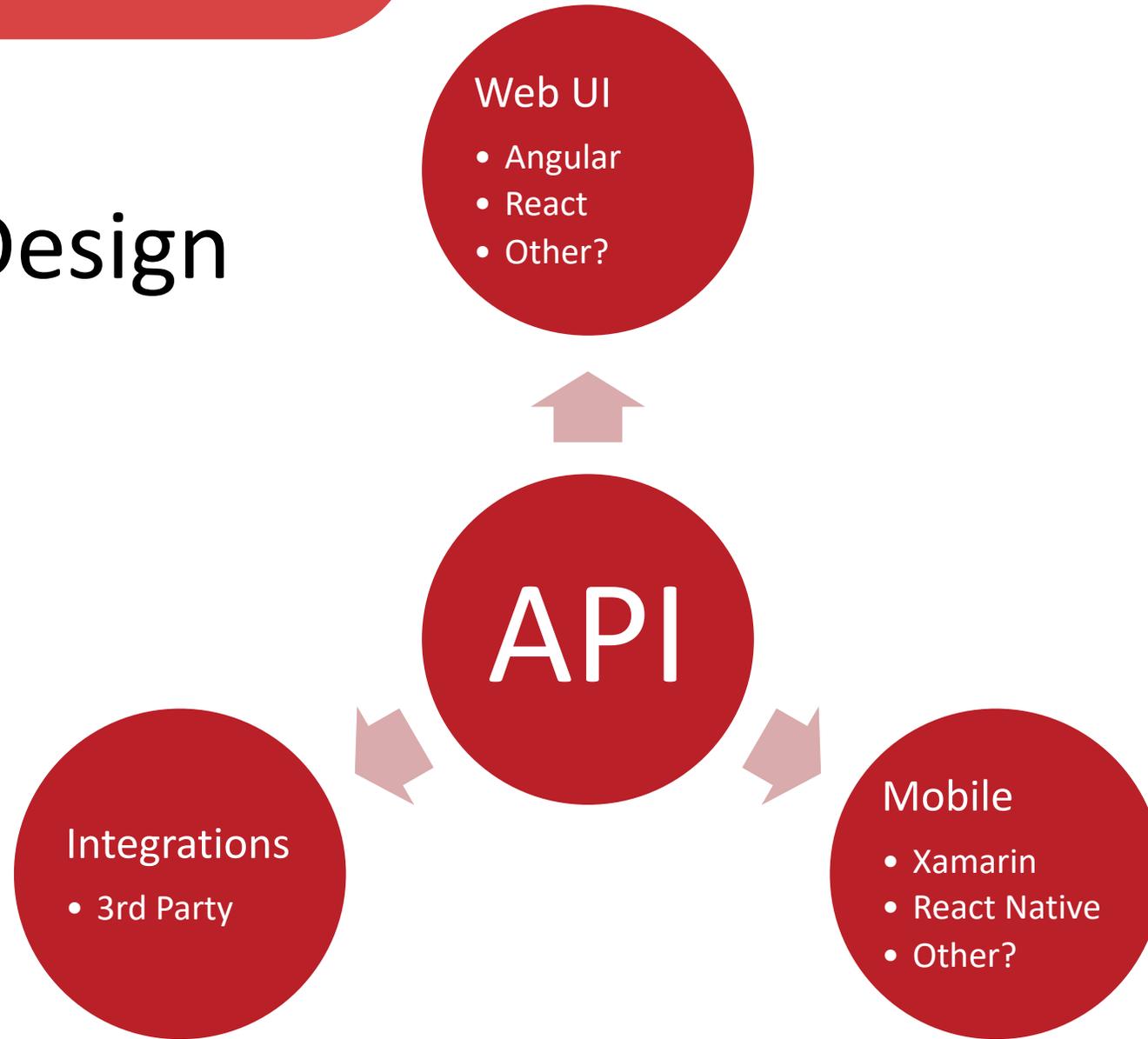
Reliability



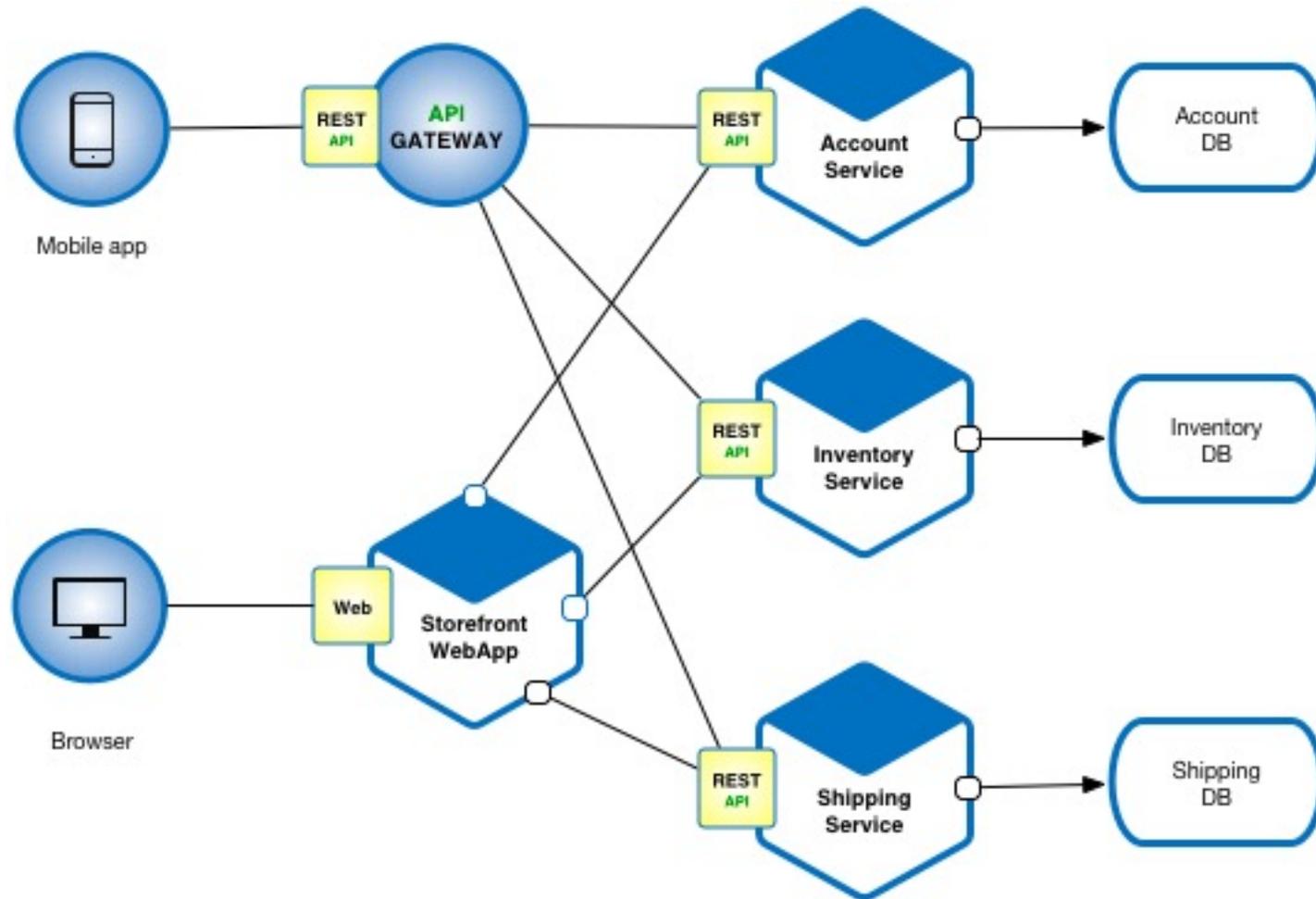
Security



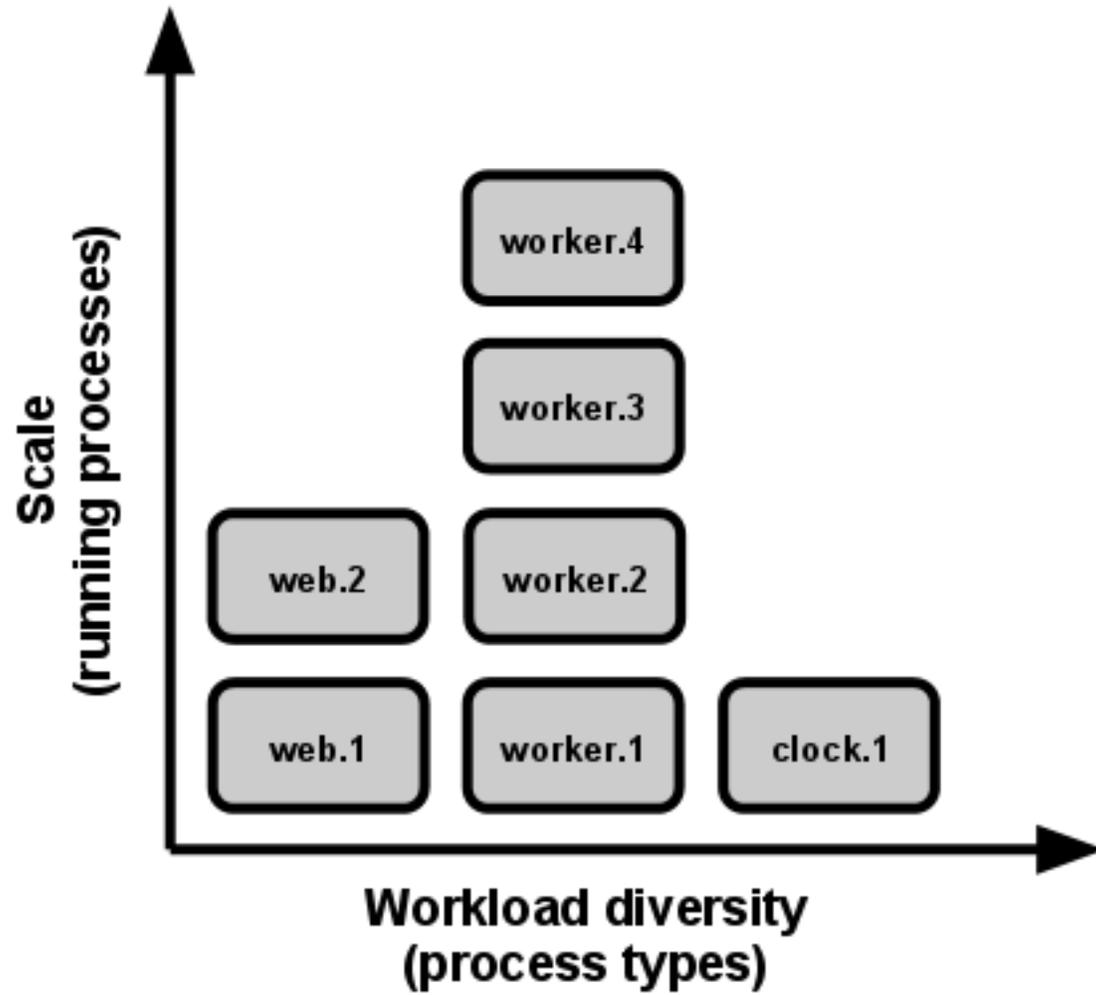
Modular Design



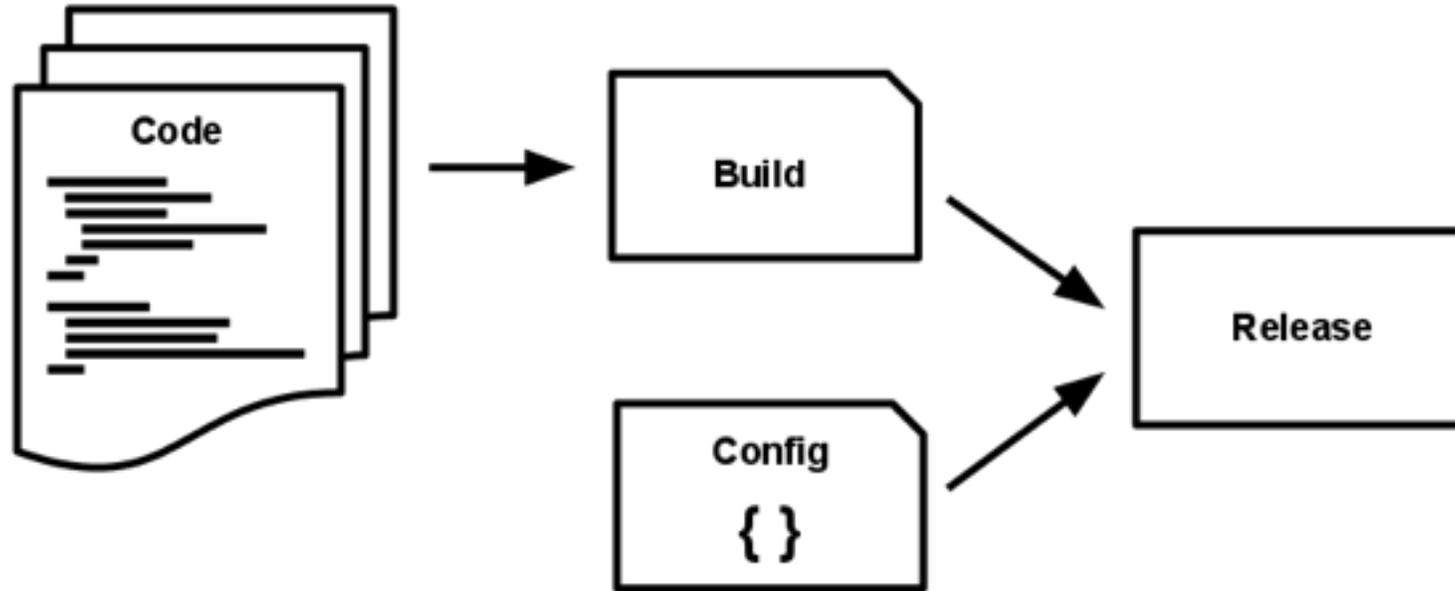




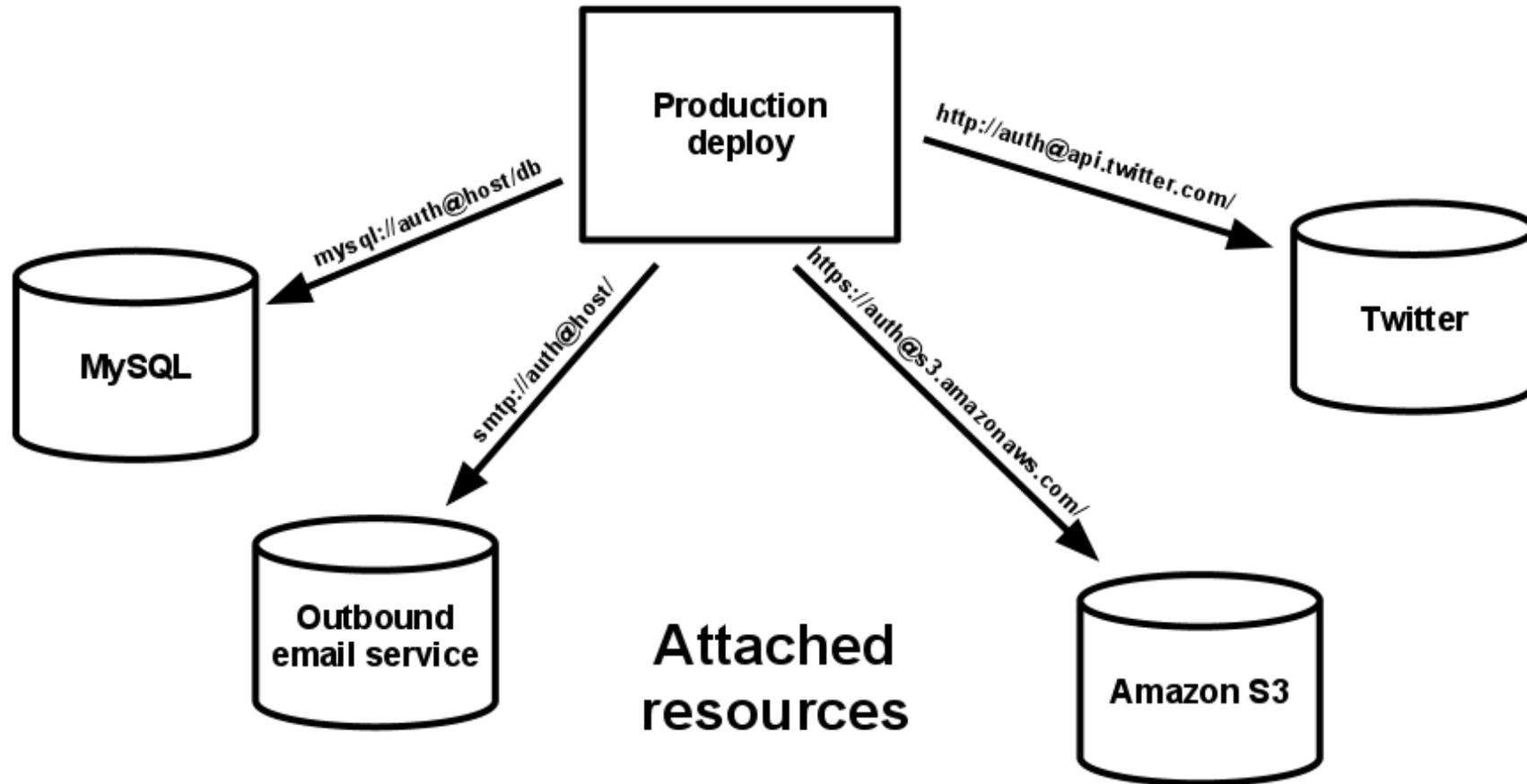
The Twelve-Factor App



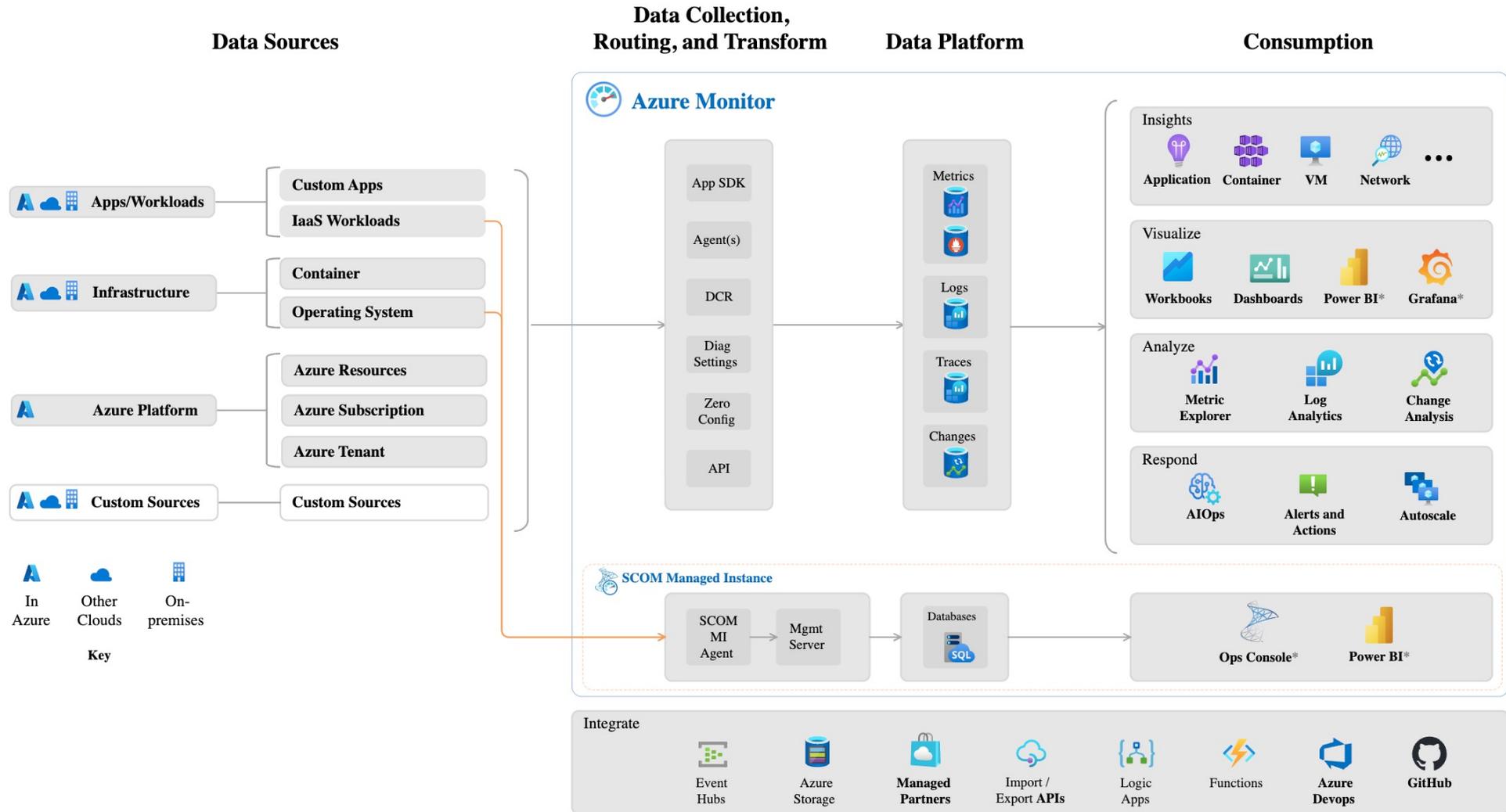
<https://12factor.net/>



<https://12factor.net/>



Monitoring and Observability



- Create a resource
- All services
- FAVORITES
- Dashboard
- All resources
- Resource groups
- App Services
- Function Apps
- SQL databases
- Azure Cosmos DB
- Virtual machines
- Load balancers
- Storage accounts
- Virtual networks
- Azure Active Directory
- Monitor
- Advisor
- Security Center
- Cost Management + Billing
- Help + support
- Application Insights

fabrikamprod Dashboard

+ New dashboard Upload Download Edit Unshare Full screen Clone Delete

fabrikamprod APPLICATION INSIGHTS

fabrikamprod ALERTS (CLASSIC)

1 2

Smart Detection

1 Detection (7d)

Live Stream

2 Servers

44% Availability

App map

Usage

6.5k Users

Reliability

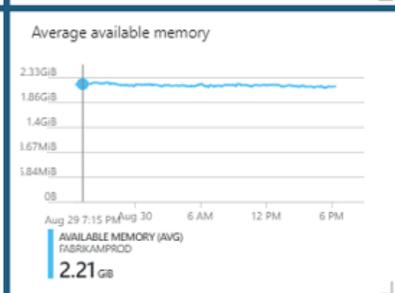
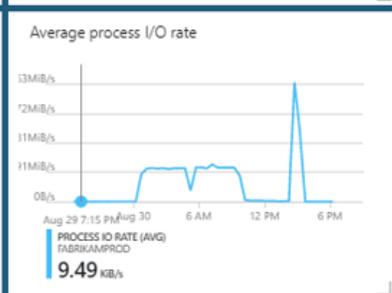
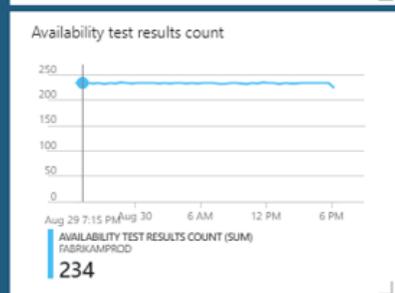
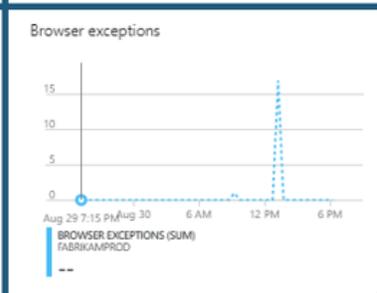
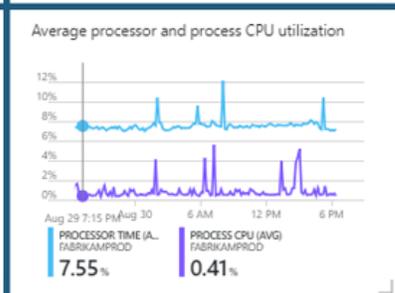
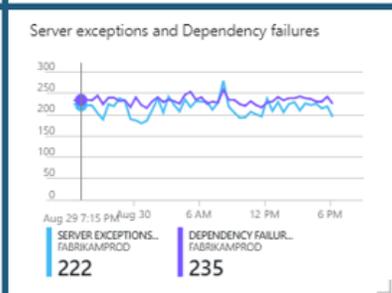
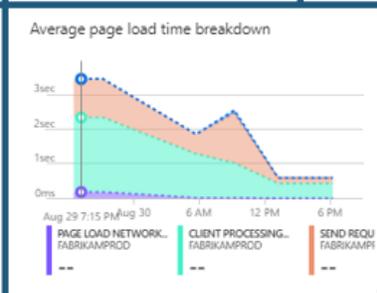
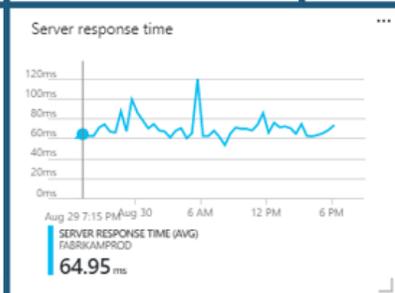
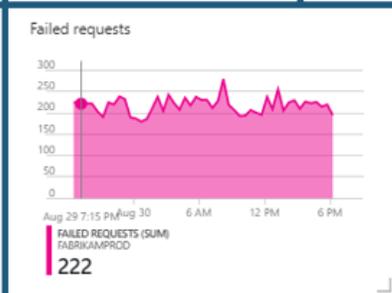
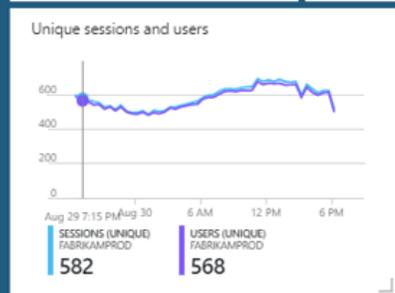
Failures FABRIKAMPROD

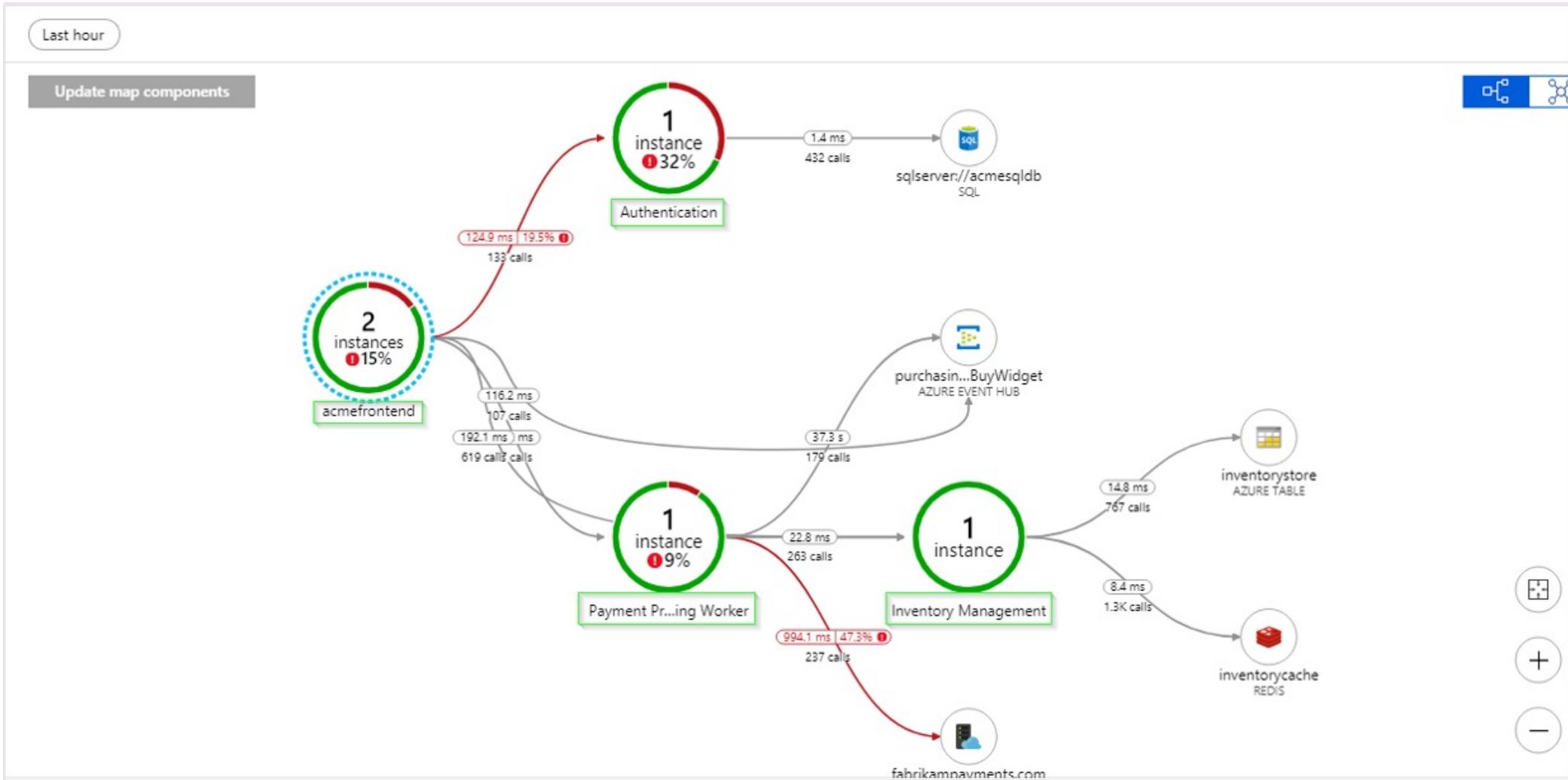
Responsiveness

Performance FABRIKAMPROD

Browser

BROWSERS





DevOps and Code

.NET Core vs. Full Framework

3rd Party Components

- Commercial or Open Source

Target containerization

Automate build/deployment

Design with monitoring in mind

Consider how to load test and prove scale

Consider modularizing app and deployments

- Website vs API vs Mobile
- Separate versioning



Plan for multiple environments

Development

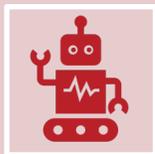
Testing

Staging

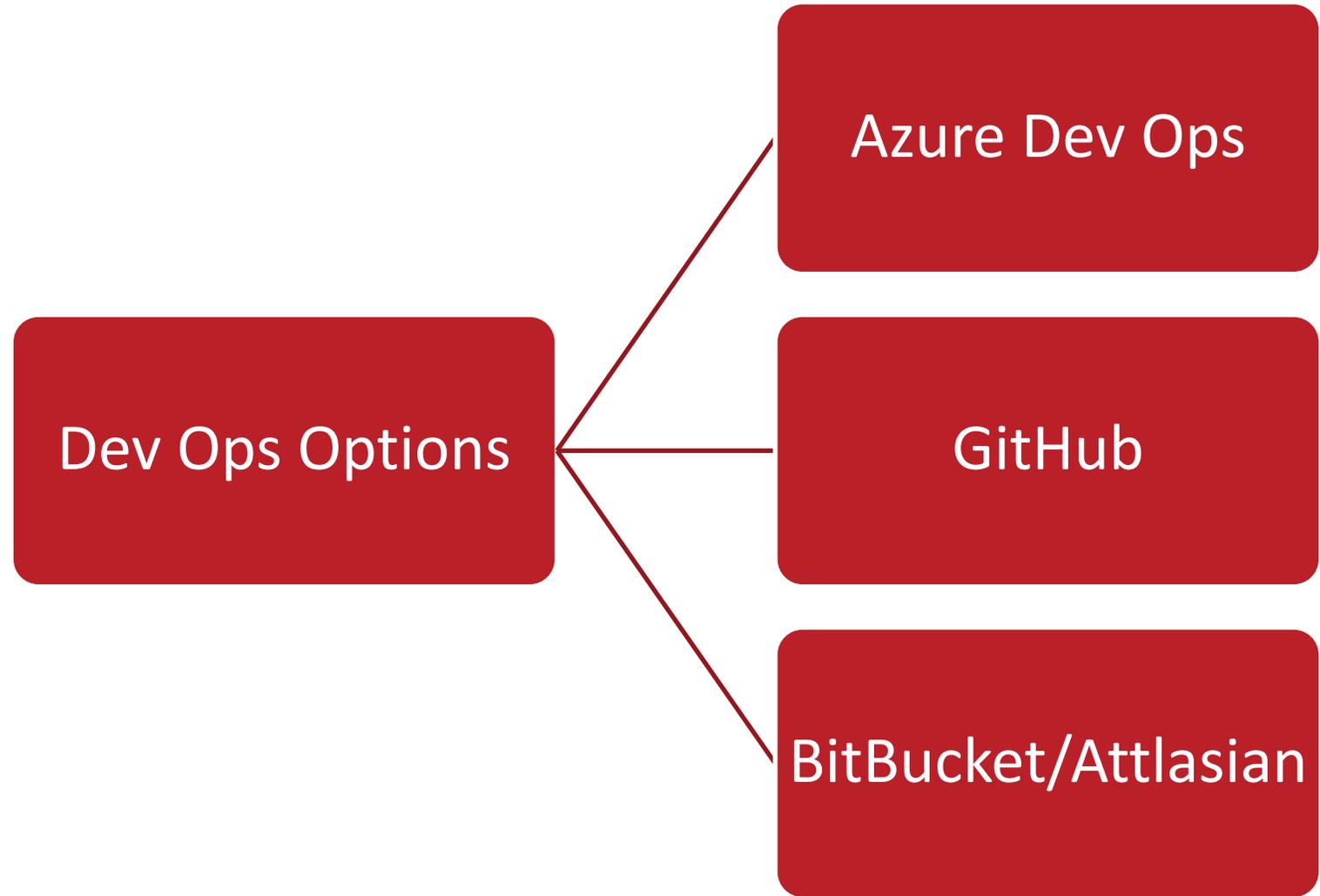
Production

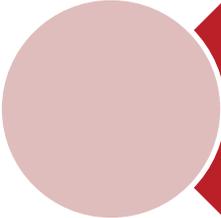


Document Configuration Changes

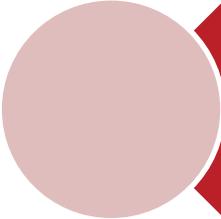


Automate via Azure Pipelines

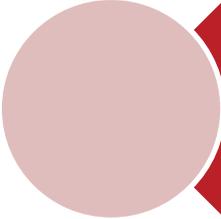




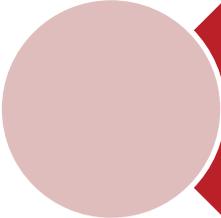
Source Control (Git)



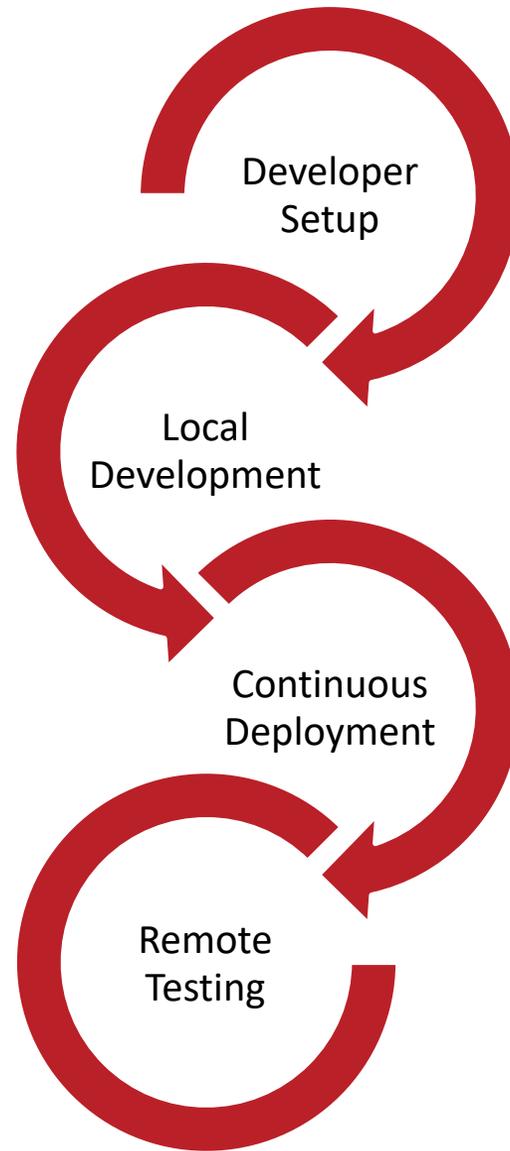
Build/Release Management



Agile Planning



Testing



<https://trunkbaseddevelopment.com/>

Azure Basics

COLOR CODE

AI + Machine Learning Analytics Compute Databases Development Identity + Security IoT + MR Integration Mgmt + Governance Media + Comms Migration Networking Storage

STARTERS

Infrastructure-as-a-Service, basic building blocks, essential services

Azure VMware Solution	Container Instances	Virtual Desktop	Virtual Machines	VM Scale Sets	Azure Active Directory	Security Center	Azure Advisor	Azure Backup	Azure Monitor	Azure Portal	Cloud Shell	Cost Management
Azure Migrate	DB Migration Service	Azure Bastion	Azure Firewall	Load Balancer	Private Link	Virtual Network	VPN Gateway	Azure Storage	Managed Disks			

MAIN COURSES

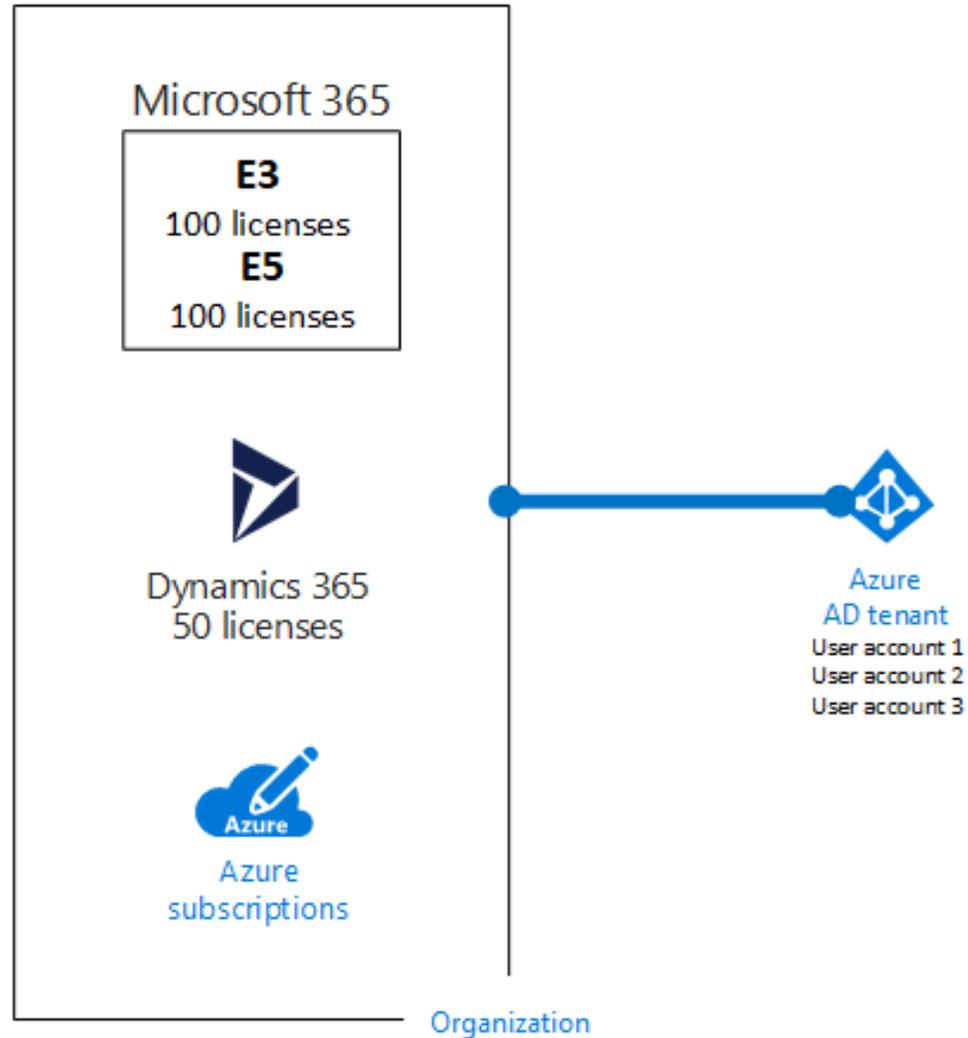
Mainstream Platform-as-a-Service, managed services

Cognitive Search	Data Factory	Event Hubs	Power BI Embedded	Synapse Analytics	App Service	App Service (Linux)	Azure Batch	Azure Functions	Cloud Services	Container Registry	Kubernetes Service	Service Fabric
Cosmos DB	Database for MariaDB	Database for MySQL	Database for PostgreSQL	Redis Cache	SQL Database	Azure DevOps	DevTest Labs	SignalR Service	Visual Studio App Center	Azure AD B2C	Azure AD DS	Azure Defender
Azure Key Vault	Azure Sentinel	Information Protection	API Management	Event Grid	Logic Apps	Notification Hubs	Service Bus	Web PubSub	Azure Maps	Automation	Azure Automanage	Azure Blueprints

<https://azurecharts.com/menu>

Azure Basics

- Tenant
 - Houses the users
- Organization
 - Domain
- Subscriptions
 - M365
 - Dynamics
 - Azure



Azure Portal

The screenshot displays the Microsoft Azure Portal interface. At the top, there is a search bar and user information for 'awill@architectnow.net'. The left sidebar contains navigation options such as 'Create a resource', 'Home', 'Dashboard', 'All services', and a 'FAVORITES' section with items like 'App Services', 'Resource groups', and 'SQL databases'. The main content area is divided into three sections: 'Azure services' with icons for various services like 'Resource groups', 'Azure Active Directory', and 'Azure Cosmos DB'; 'Recent resources' which is a table listing various resources and their last viewed times; and 'Navigate' which provides quick access to 'Subscriptions', 'Resource groups', 'All resources', and 'Dashboard'. A 'Tools' section is also visible at the bottom.

Azure services

- Create a resource
- Resource groups
- Azure Active Directory
- Azure Cosmos DB
- Cost Management ...
- Subscriptions
- Application Insights
- Data factories
- Container registries
- More services

Recent resources

Name	Type	Last Viewed
thatconf-baked	App Configuration	6 hours ago
thatconf-baked	Resource group	7 hours ago
thatconf-workshop-tf	Resource group	7 hours ago
NetworkWatcherRG	Resource group	7 hours ago
DefaultResourceGroup-CUS	Resource group	7 hours ago
an-datafactory-test	Data factory (V2)	2 days ago
architectnow-admin-devdata	Azure Cosmos DB account	2 days ago
Azure Playground	Subscription	2 days ago
thatconf-baked-dash-dev	App Service	a week ago
thatconf-baked-dev	App Service	a week ago
thatconf-baked	App Service	a week ago
thatconf-baked-dash	App Service	a week ago

Navigate

- Subscriptions
- Resource groups
- All resources
- Dashboard

Tools

<https://portal.azure.com/>



Hybrid Deployments



Migrate some aspects of an application in the cloud and maintain others internally



Data Center selection is critical



Be Creative and use Common Sense

Types of Azure Subscriptions

Pay-As-You-Go

VS Benefits

EA

Sponsorship

CSP

Dev/Test

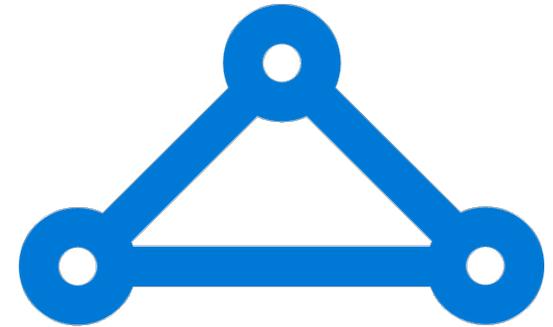
Types of Pricing

- License Based
 - Per User
 - Per App
- Pay-as-you-go
- Reserved Pricing
- Spot Pricing



Base Costs - Bandwidth

- Ingress*: Free
- Egress: .05 – 0.0875
per GB



Azure VMs (IAAS)

- Pay-as-you-go
 - Pay only when it is on
 - Pay per hour
- Reserved
 - Known capacity. Purchase chunks for discount
- Spot
 - Purchase unused capacity for discount
- Types
 - Memory, General, CPU, Storage
- Auto turn-off
- Scale Sets



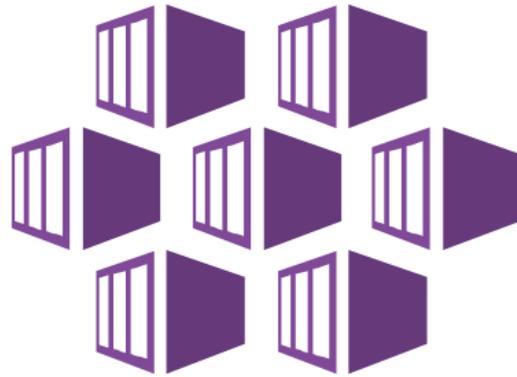
Azure App Services

- Pay-as-you-go
- You still pay when it is turned off
- Types
 - Free, Shared, Basic, Standard, Premium, Isolated
- Scale out, and Up
- Pay at the Service Plan level
- SLA when more than 1 instance



Azure Kubernetes Services

- No Charge for managing Cluster
- Based on VM Pricing for nodes



Azure Kubernetes Service (AKS)

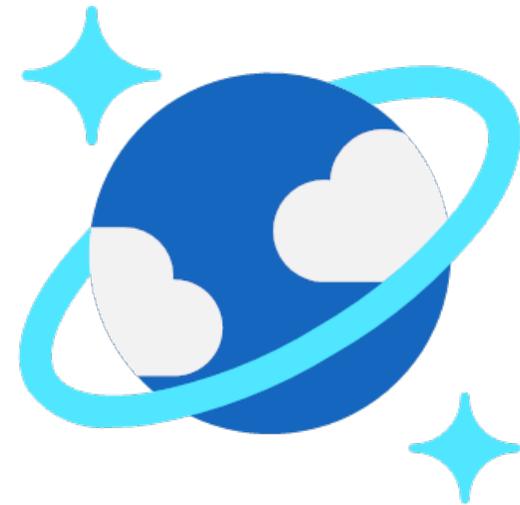
Azure SQL

- Serverless
- V-Core
- DTU
 - Database Transaction Unit
 - CPU, Memory, I/O
- Single Database
- Elastic Pool
- Service Tier
 - Basic, Business
 - Critical, HyperScale



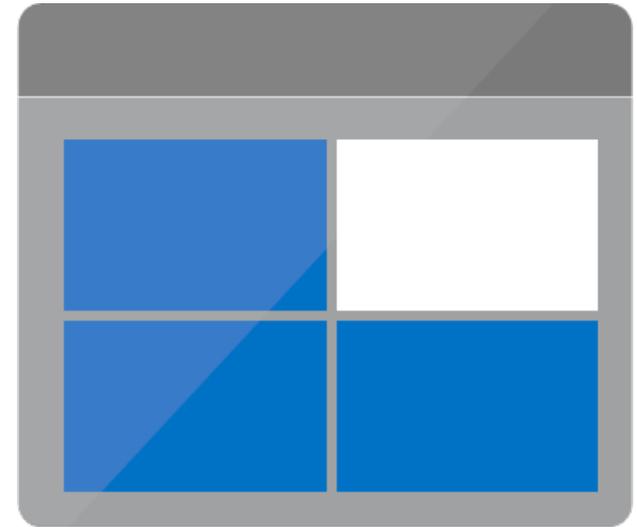
Azure Cosmos

- Provisioned Throughput
- Serverless
- Storage Costs
- RUs
 - Request Units



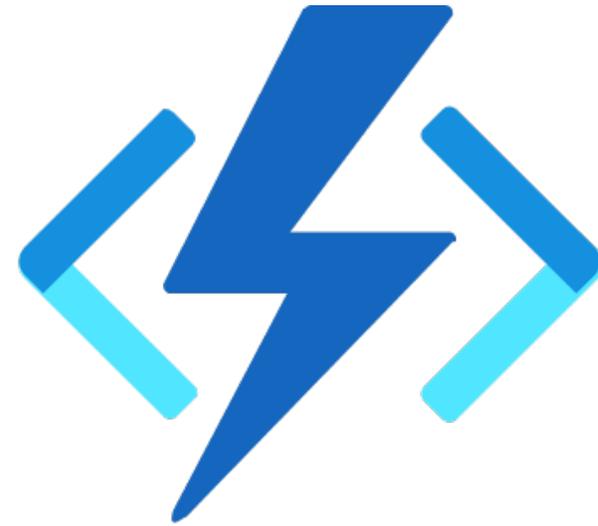
Azure Blob Storage

- Premium/Hot/Cold/Archive
- Priced per GB
- Tiered Pricing on TB



Azure Functions

- Consumption
 - 1 Million Free
 - Cold Starts
- Premium
 - Pay for Cores, and Memory
- App Service Plan



Azure App Insights

- Commitment
- Pay-as-you-go
 - \$2.76 /GB
 - First 5 GB free
- Cost for storage
 - 0.12 per GB
- Alerts



Azure Pricing Calculator

Pricing calculator

Configure and estimate the costs for Azure products



Products

Example Scenarios

Saved Estimates

FAQs

Select a product to include it in your estimate.

Search products

Popular

Compute

Networking

Storage

Web

Mobile

Containers

Databases

Analytics

AI + machine learning

Internet of Things

Integration

Identity

 **Virtual Machines**
Provision Windows and Linux VMs in seconds

 **Storage Accounts**
Durable, highly available, and massively scalable cloud storage

 **Azure SQL Database**
Managed, intelligent SQL in the cloud

 **App Service**
Quickly create powerful cloud apps for web and mobile

 **Azure Cosmos DB**
Fast NoSQL database with open APIs for any scale

 **Azure Kubernetes Service (AKS)**
Build and scale with managed Kubernetes

 **Azure Functions**
A serverless, event-driven compute service that allows you to write less code, maintain less infrastructure, and save on costs

 **Azure Cognitive Services**
Deploy high-quality AI models as APIs

 **Azure Cost Management and Billing**
Manage your cloud spending with confidence

<https://azure.microsoft.com/en-us/pricing/calculator/>

Azure Cost Management

ACTUAL COST (USD) ⓘ

\$29,437.46 ▾

FORECAST: CHART VIEW ON ⓘ

\$38,163.98 ▾

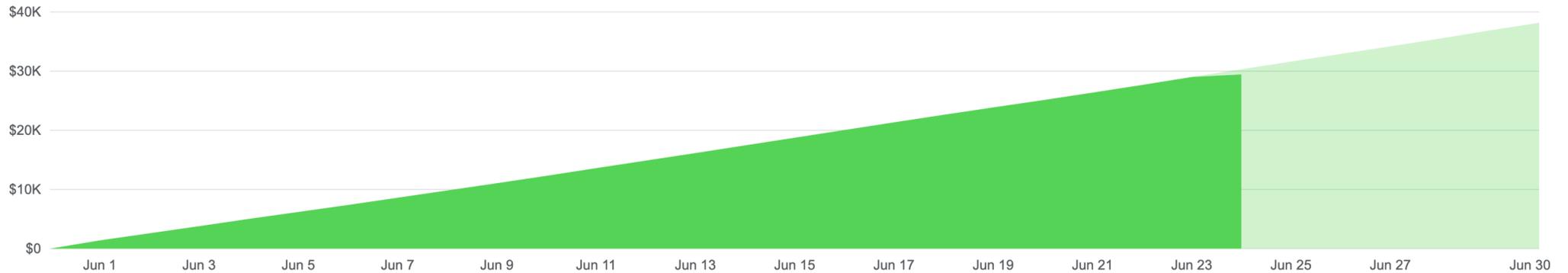
BUDGET: NONE

-- ▾

Group by: None ▾

Granularity: Accumulated ▾

Area ▾



● Accumulated cost

● Forecast cost

Service name ▾



azure app service
\$8,689.83

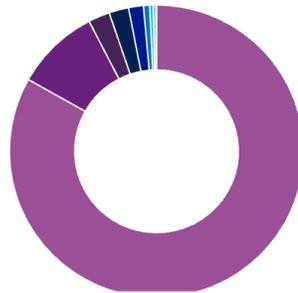
sql database
\$7,443.90

redis cache
\$3,167.26

virtual machines
\$1,534.01

log analytics
\$1,122.50

Location ▾



us central
\$24,480.34

us east
\$2,724.22

us south central
\$696.38

us west
\$636.25

us north central
\$170.00

Subscription ▾



[Redacted]
\$29,437.46

Azure Cost Management

+ Add Refresh ? Help ▾

Scope :  **Azure Playground**

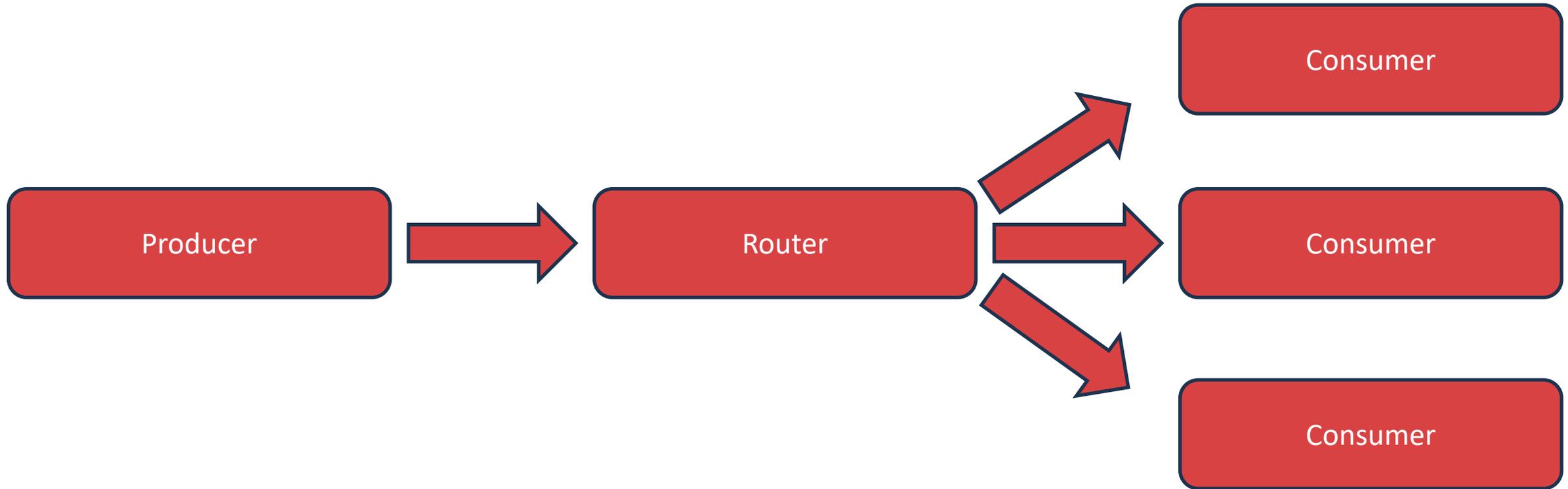
Search by name

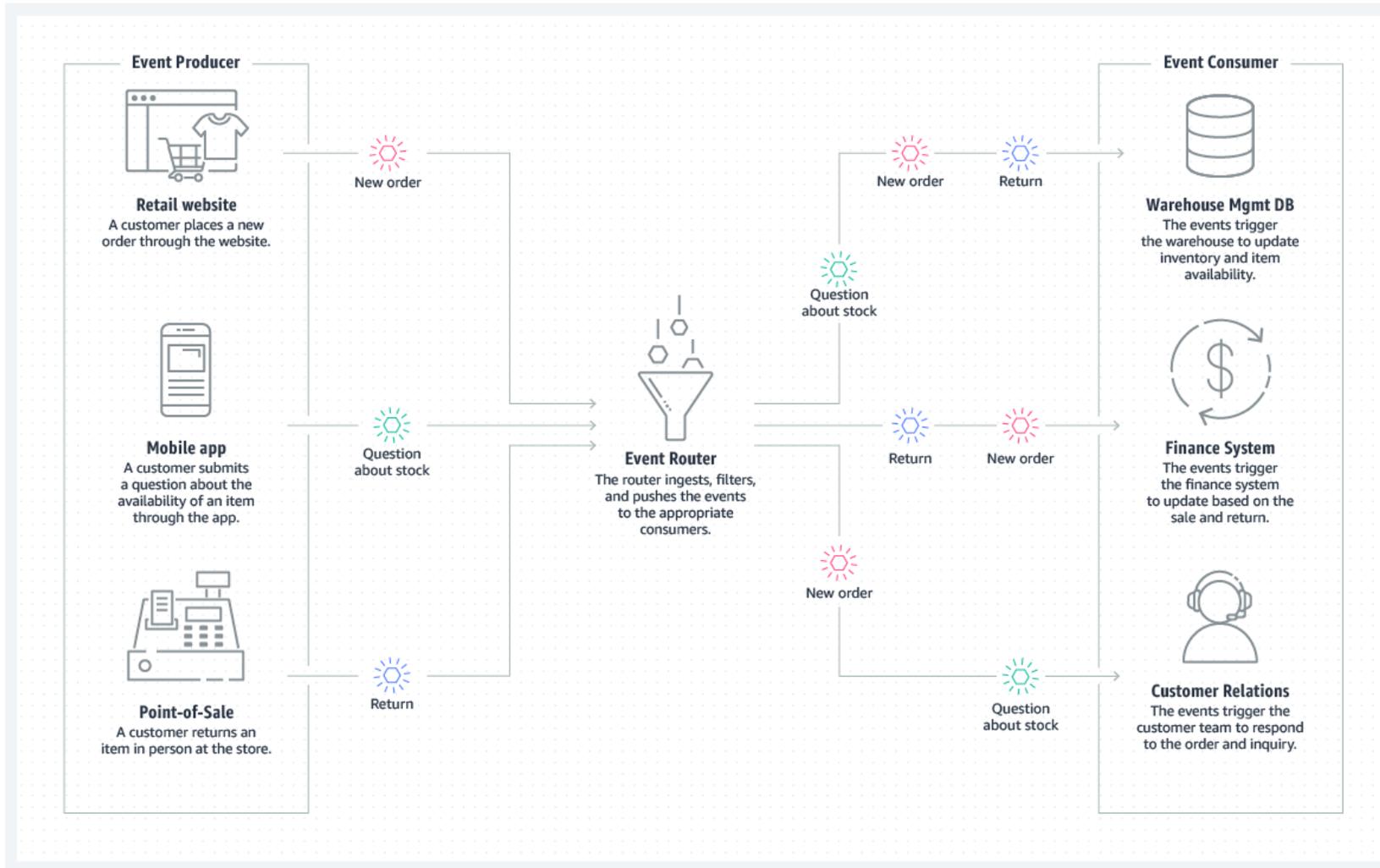
All periods ▾

 Budget evaluations now include reserved instance and purchase charges. To learn more, [visit the budgets documentation](#).

Name	↑↓	Scope	↑↓	Reset period	↑↓	Creation date	↑↓	Expiration date	↑↓	Budget	↑↓	Forecasted	↑↓	Evaluated spend	↑↓	Pr
80_percent_of_budget		94f46fe6-b726-42aa...		BillingMonth		6/12/2021		6/11/2023		\$1,000.00				\$0.00		0.

Event-Driven Design





Common Types

Pub/Sub

- Sends event to each subscriber
- No replay or history

Streaming

- Events written to log
- Typically ordered
- Consumers read from stream on their own pace

Benefits

- Decouple Producers and Consumers
- Scale Independently
- Optimize
- Compliance and Audit
- Durability
- Easy to add consumers
- Real time processing

Real World



E-commerce



IoT systems



Analytic
platforms

Click to edit Master title style

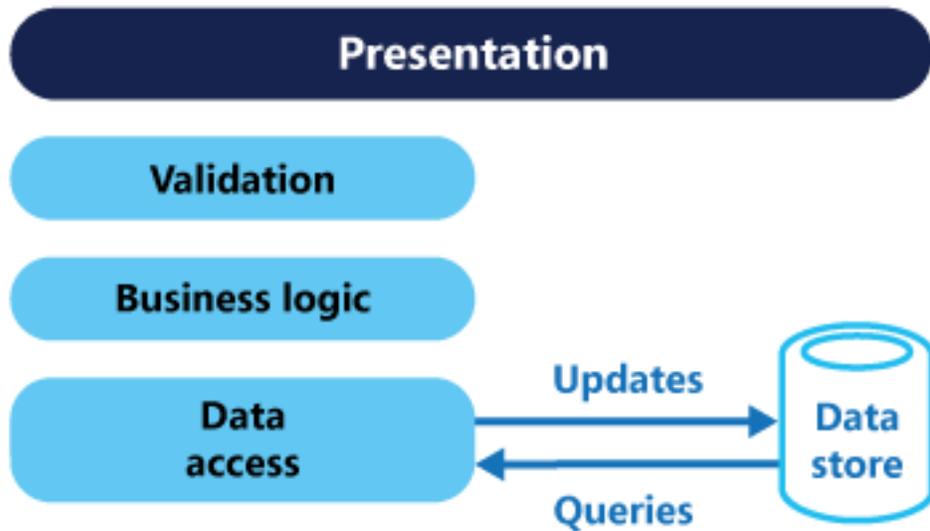
Data Centric/Management

What is Data Centric? How does it differ?

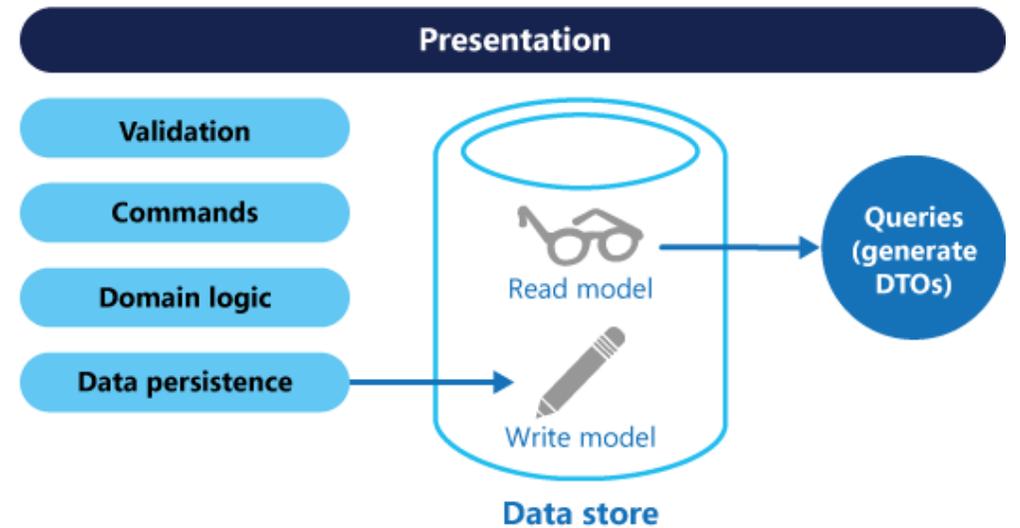
When to use Data Centric?

CQRS

BEFORE

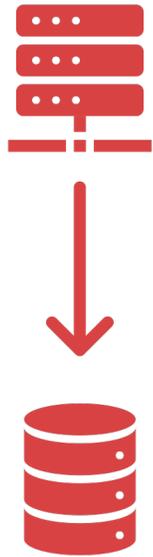


AFTER

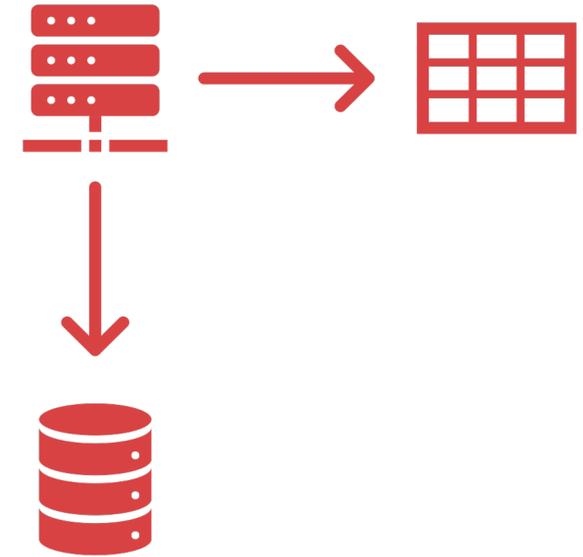


Caching

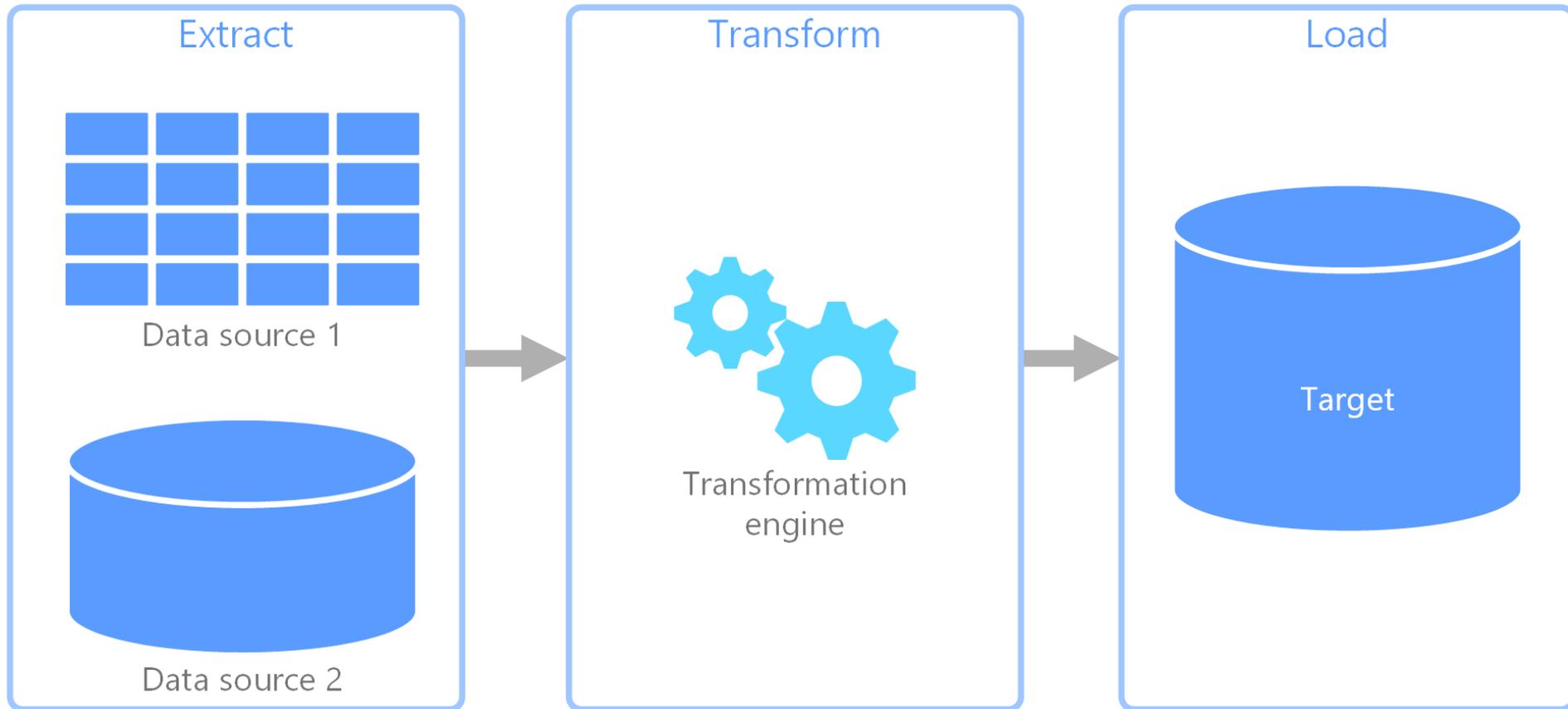
BEFORE



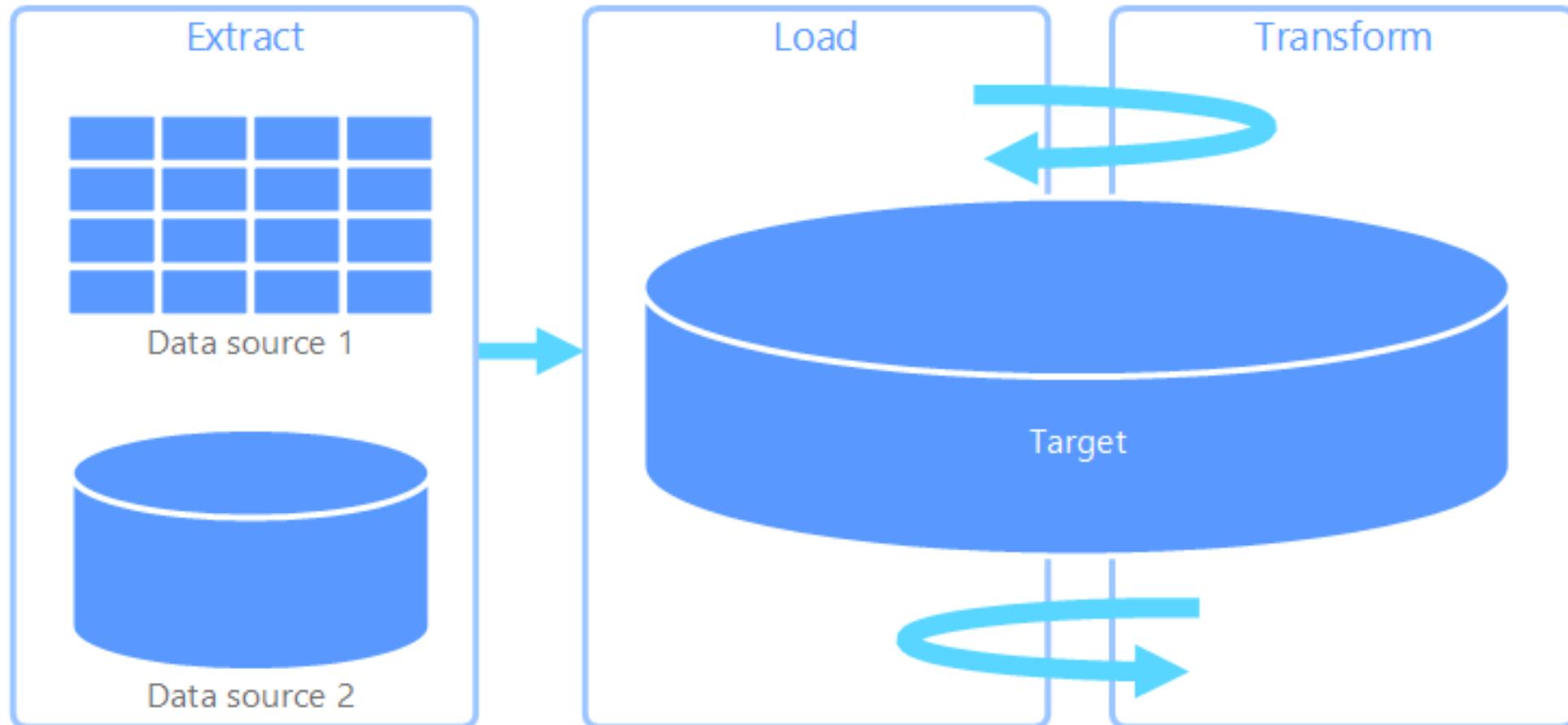
AFTER



ETL vs ELT



ETL vs ELT



Considerations

- Data Governance
- Security
- Monitoring and observability

Serverless Computing

Common Scenarios

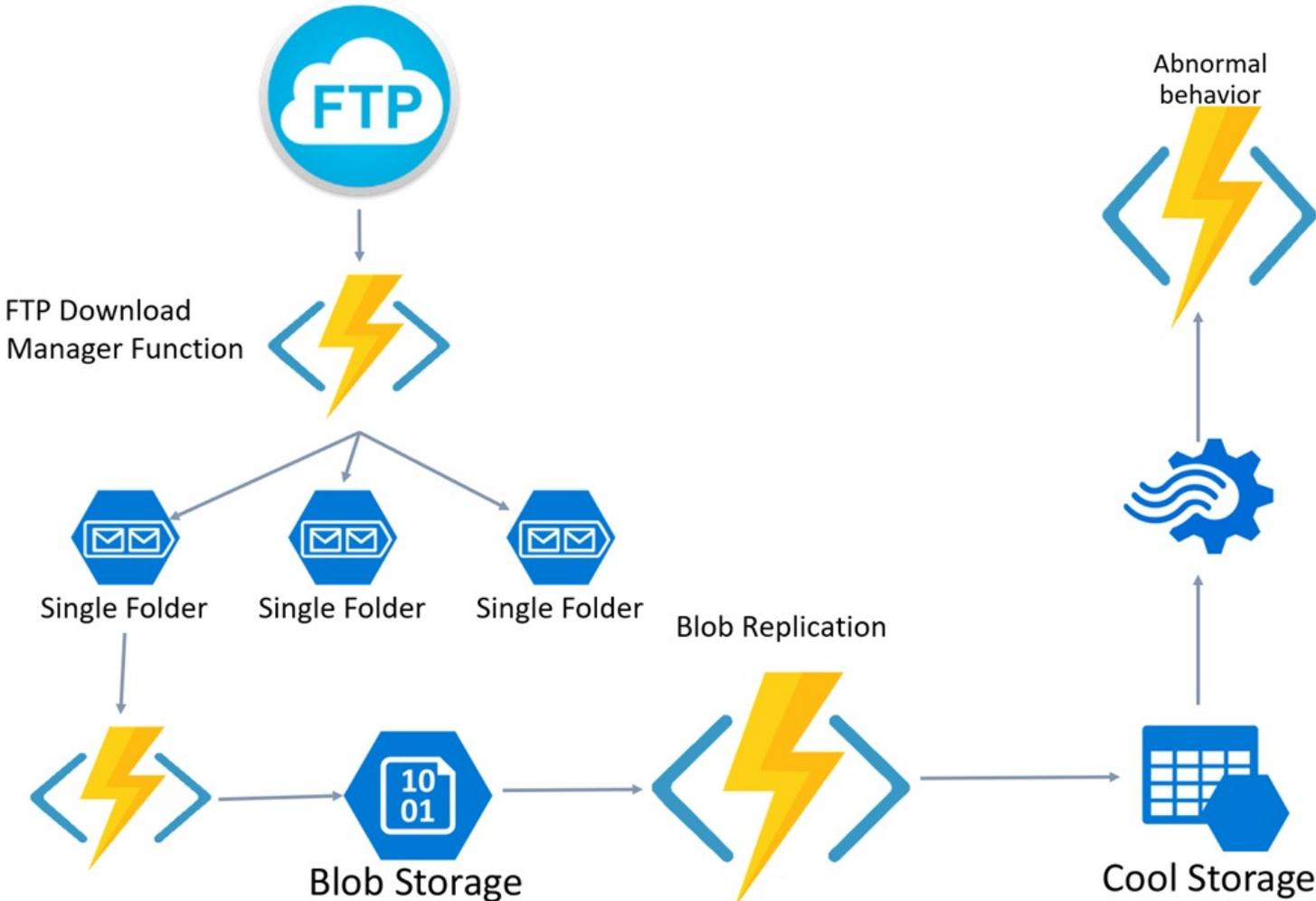


Find and clean invalid data



Clean table

Common Scenarios



Use Cases

- Data Processing
- Automation
- APIs***
- IoT
- Add-on

Benefits

- Cost
- Scaling
- Single Responsibility
- Focus on Code

Considerations

- State
- Long Running/Resource Limits
- Startup Time
- Complexity of multiple functions
- Durable functions

Demo

Low Code/No Code Solutions



The low code platform that spans Microsoft 365, Azure, Dynamics 365, and standalone apps.



Power BI
Business analytics



Power Apps
App development



Power Automate
Process automation



Power Virtual Agents
Intelligent virtual agents



Power Pages
External-facing websites



Data connectors



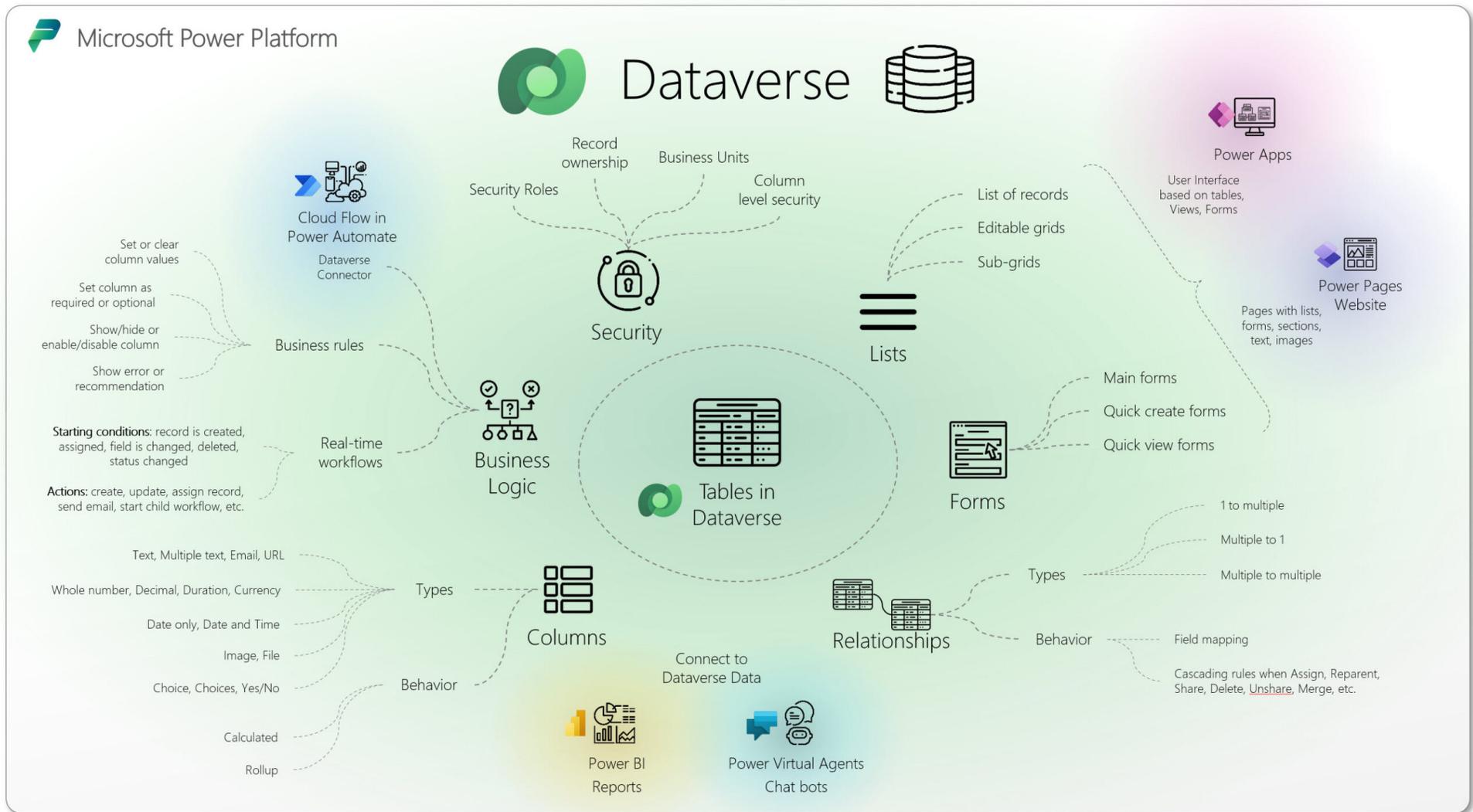
AI Builder



Dataverse

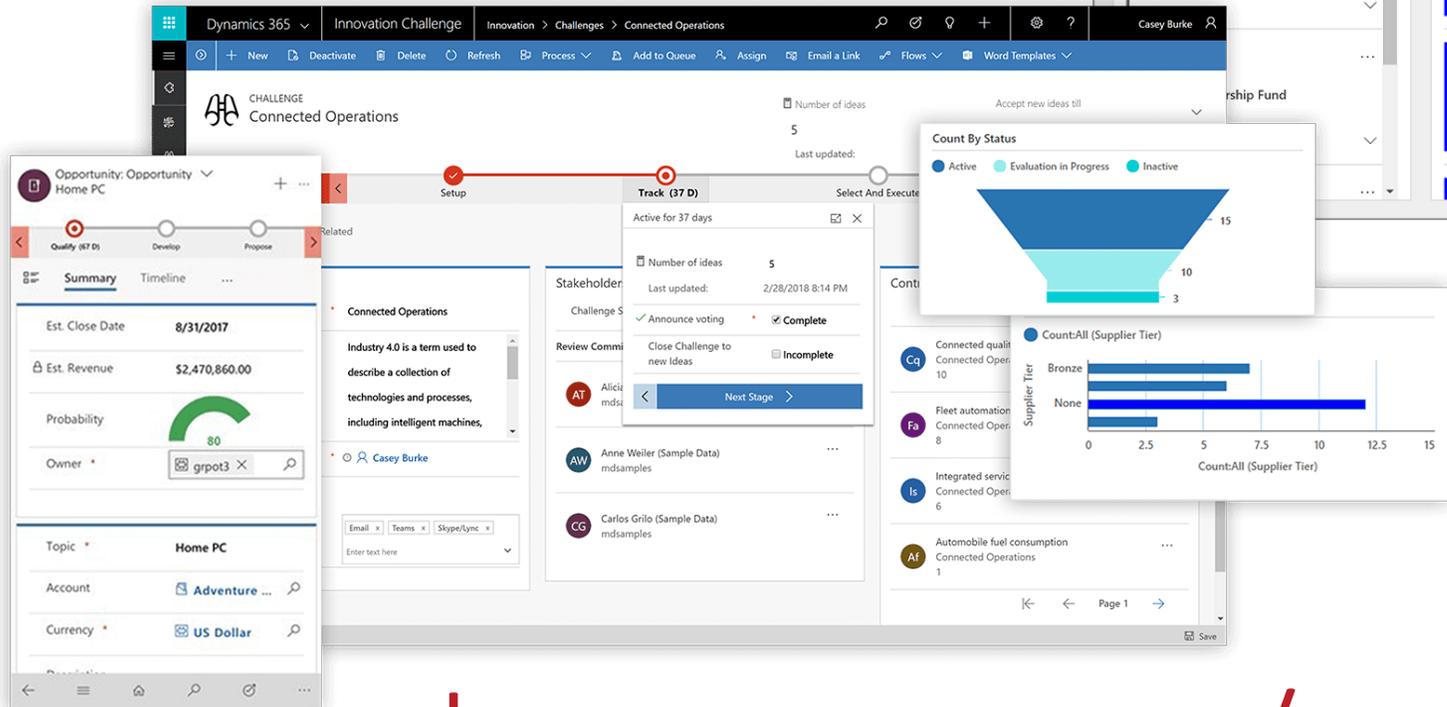
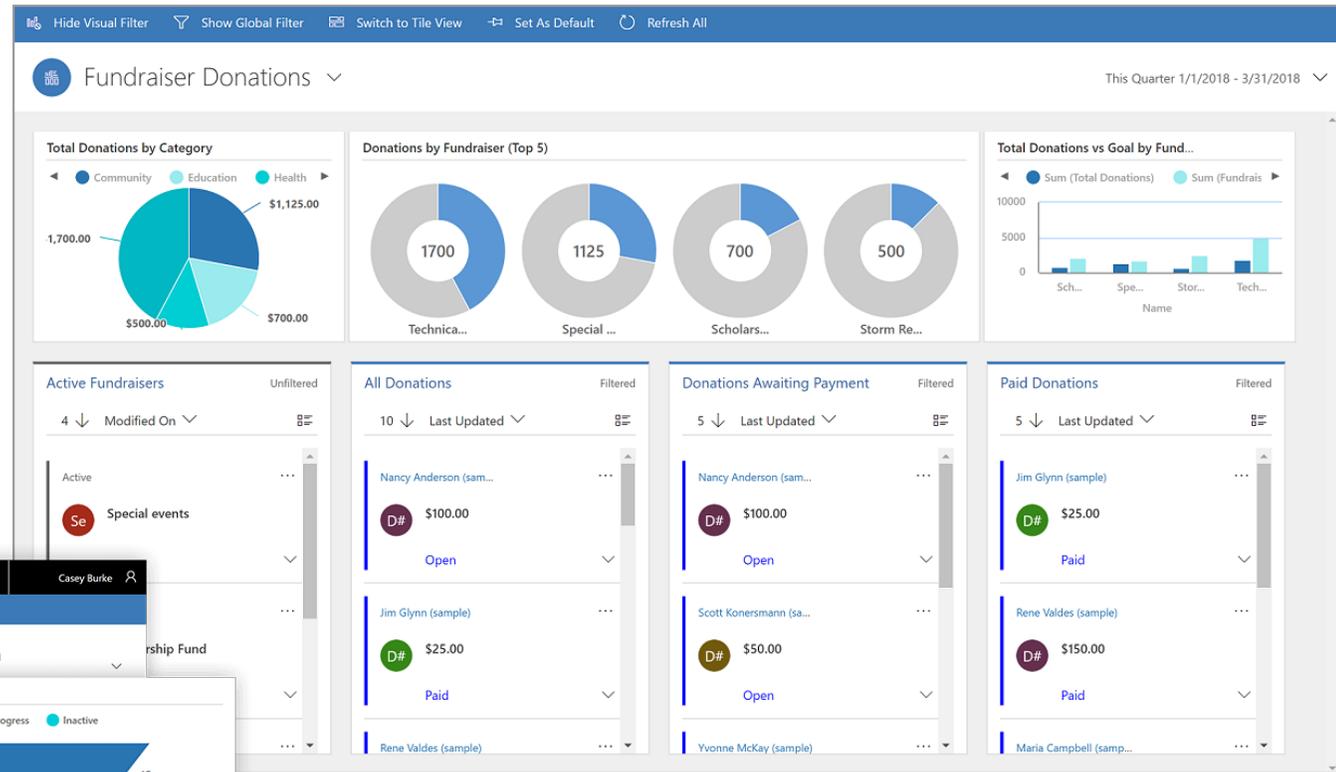
<https://make.powerapps.com/>

DataVerse



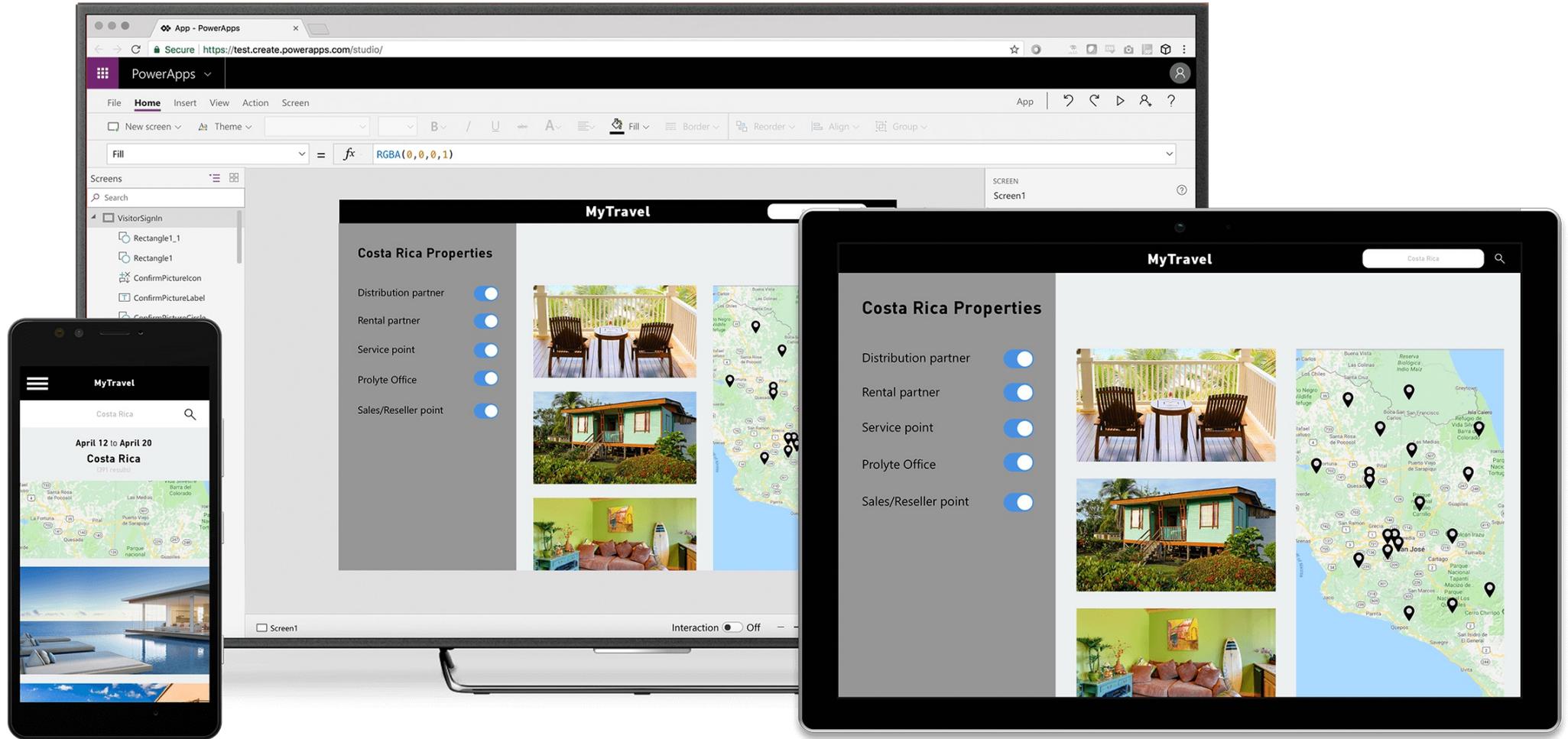
<https://make.powerapps.com/>

Model Driven Power Apps



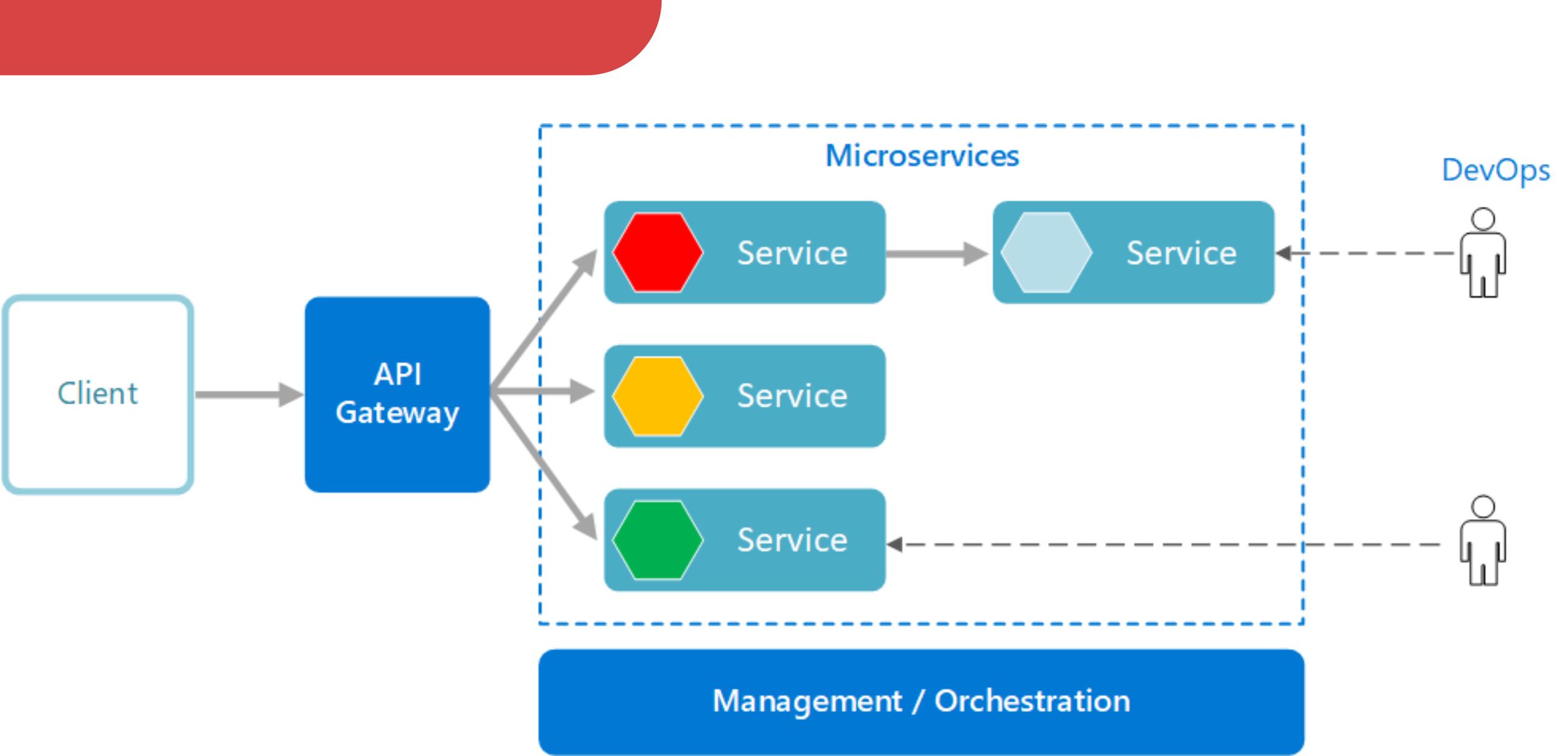
<https://make.powerapps.com/>

Canvas Power Apps



<https://make.powerapps.com/>

Microservices



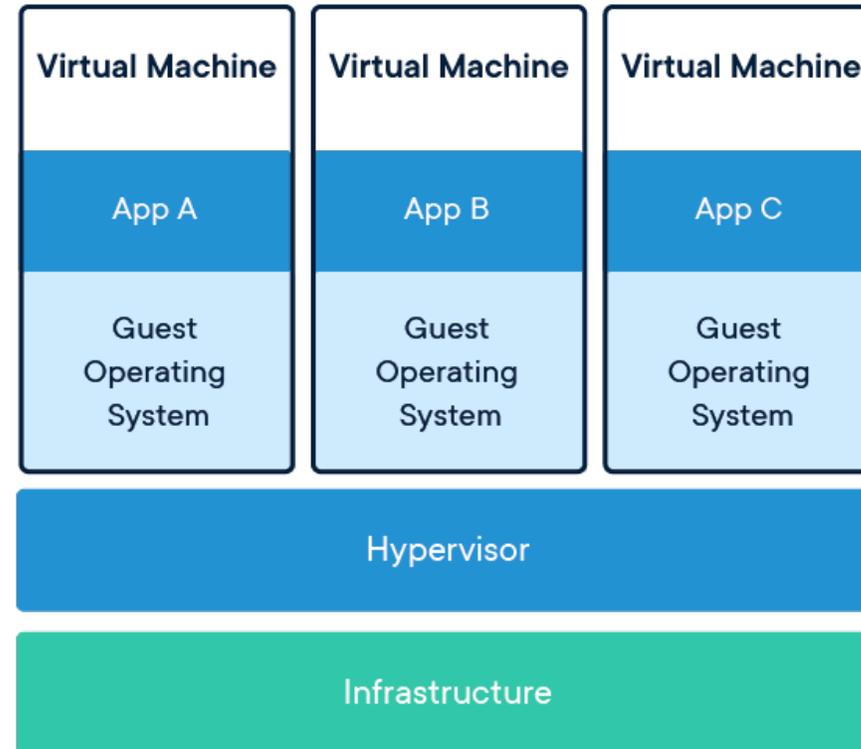
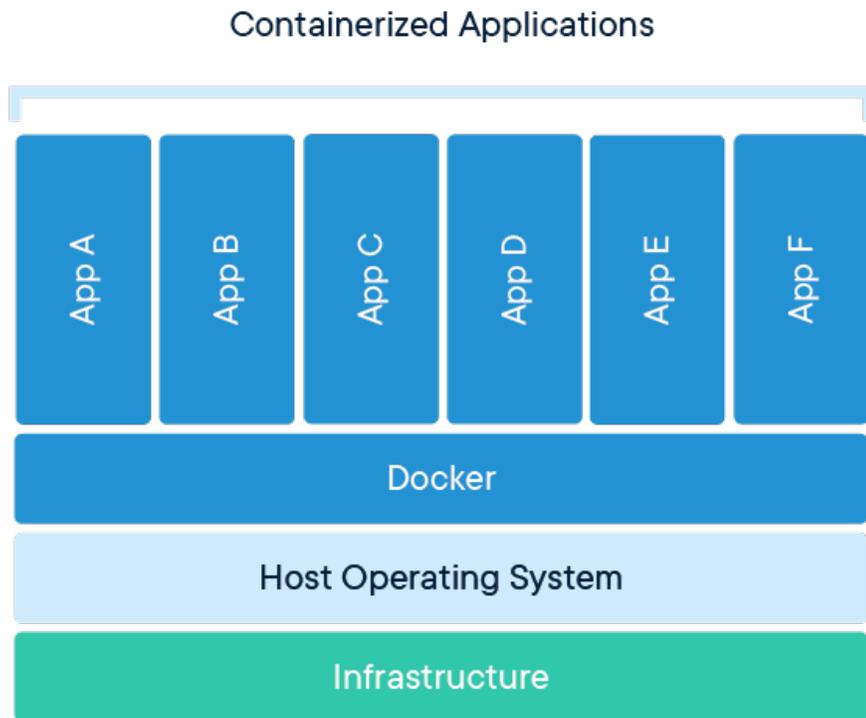
Source: <https://learn.microsoft.com/en-us/azure/architecture/microservices/>

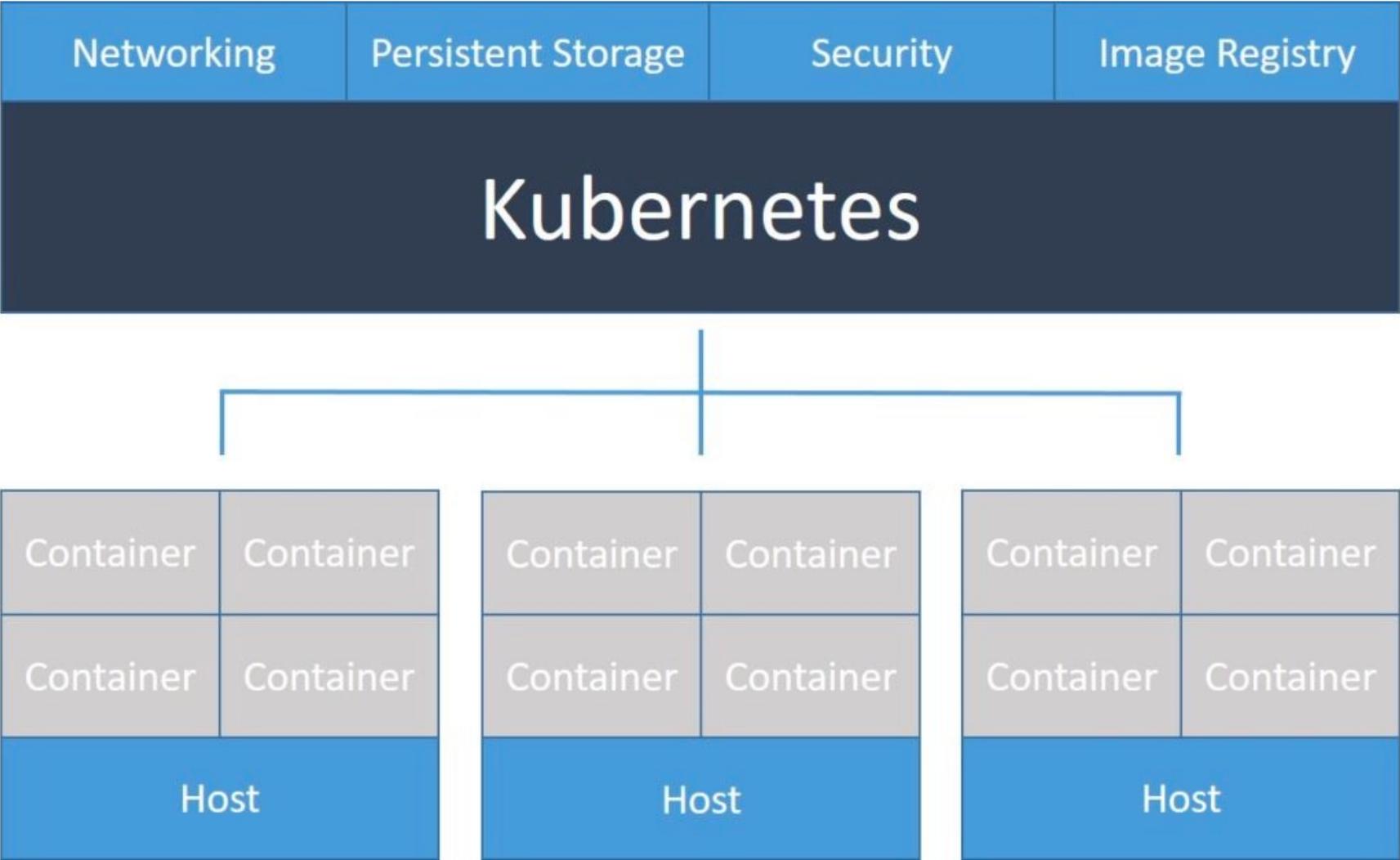
Benefits

- Scalability
- Flexibility
- Fault Isolation
- Smaller
- Data Isolation

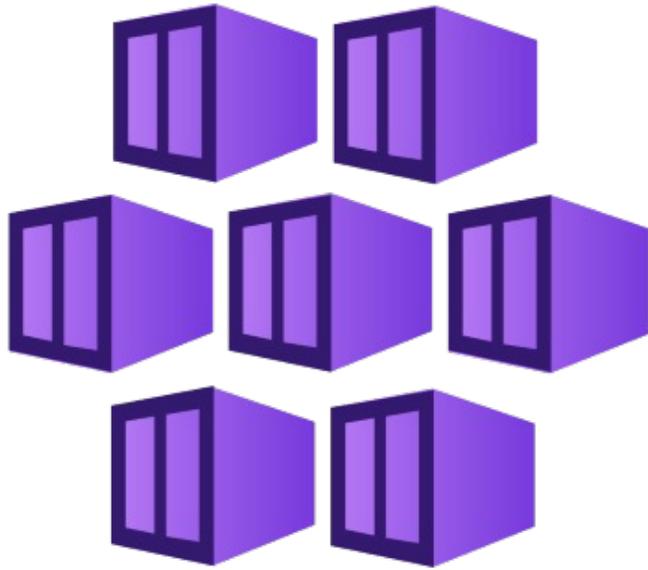
Challenges

- Complex
- Distributed Failover
- Versioning
- Management



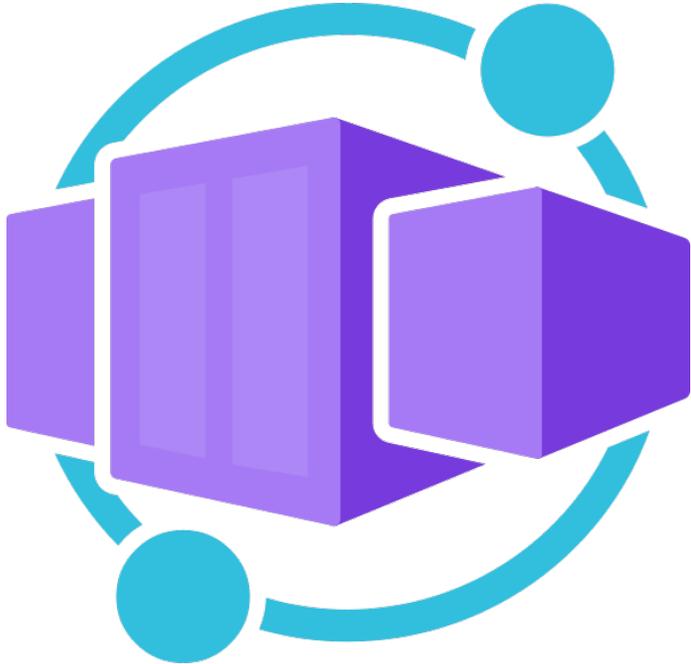


Azure Kubernetes Service



- Azure handles operational overhead
- Deploy containers
- Self Healing
- Scaling
- Private networks

Azure Container Apps



- Full managed k8s environment
- No Access to k8's api
- Public Endpoints
- Background Jobs
- Event-Driven
- Microservices

Refactor and extend code to better leverage the environment

Typically this means we phase in the use of native Azure technologies

Examples

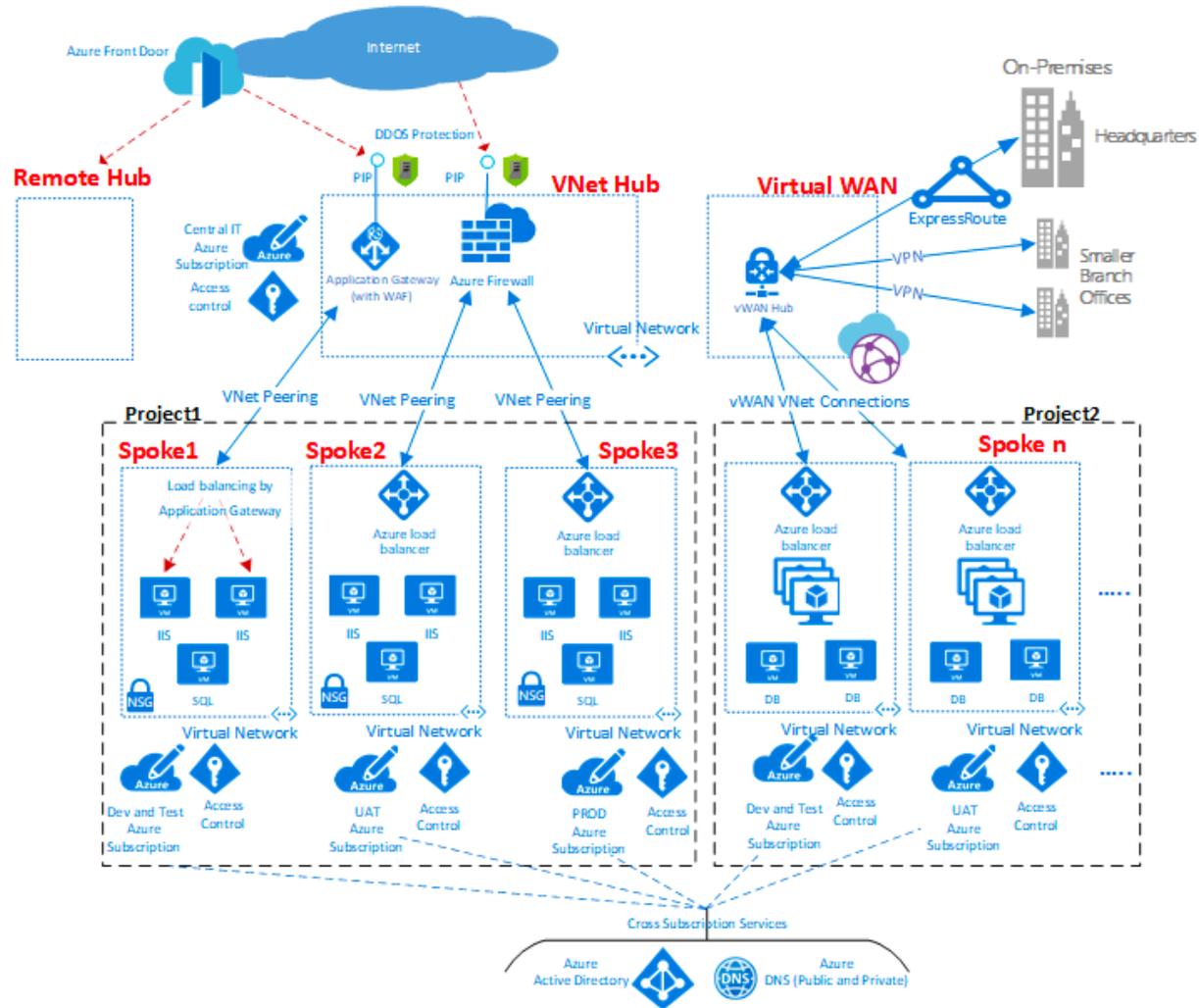
- Docker/Kubernetes
- Azure Functions
- Service Bus
- Data Factories
- Redis Cache
- Azure Search
- Cognitive Services
- Artificial Intelligence
- Machine Learning
- Azure AD
- Azure Frontdoor - <https://azure.microsoft.com/en-us/services/frontdoor/>
- API Management Services - <https://azure.microsoft.com/en-us/services/api-management/>
- Traffic Manager

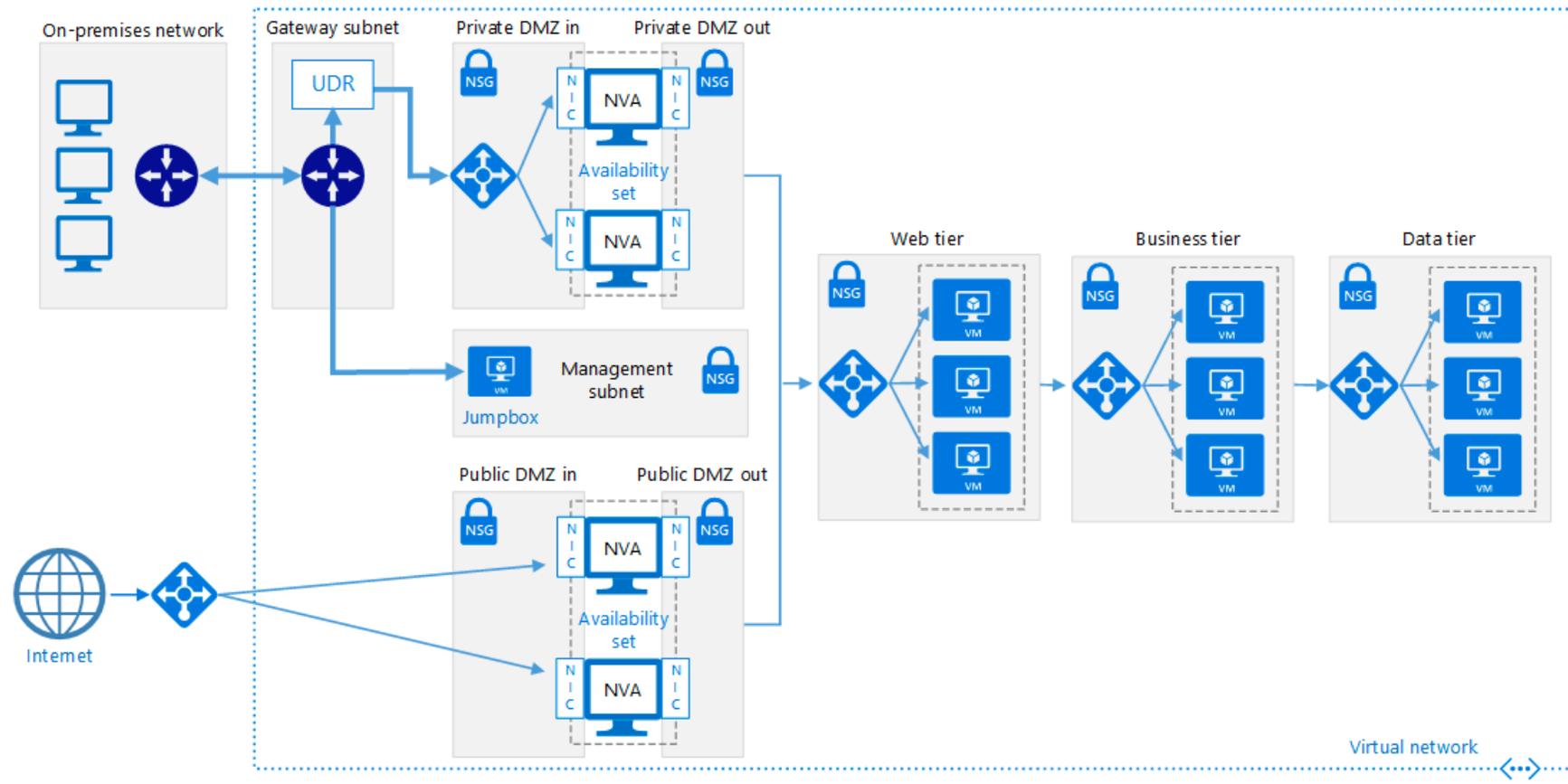
Architecture

- Very flexible infrastructure to design full network topology
- Can likely design an equivalent (or better) environment than utilized currently
- Very possible to design architectures for on-prem and Cloud to interact securely and efficiently

Hosting Options

- Azure AD
- VNETS
- Firewalls
- Load Balancer
- ExpressRoute
 - <https://azure.microsoft.com/en-us/services/expressroute/>





ADVANCED TOPICS

Infrastructure as Code

API Considerations

INFRASTRUCTURE AS CODE

Terraform

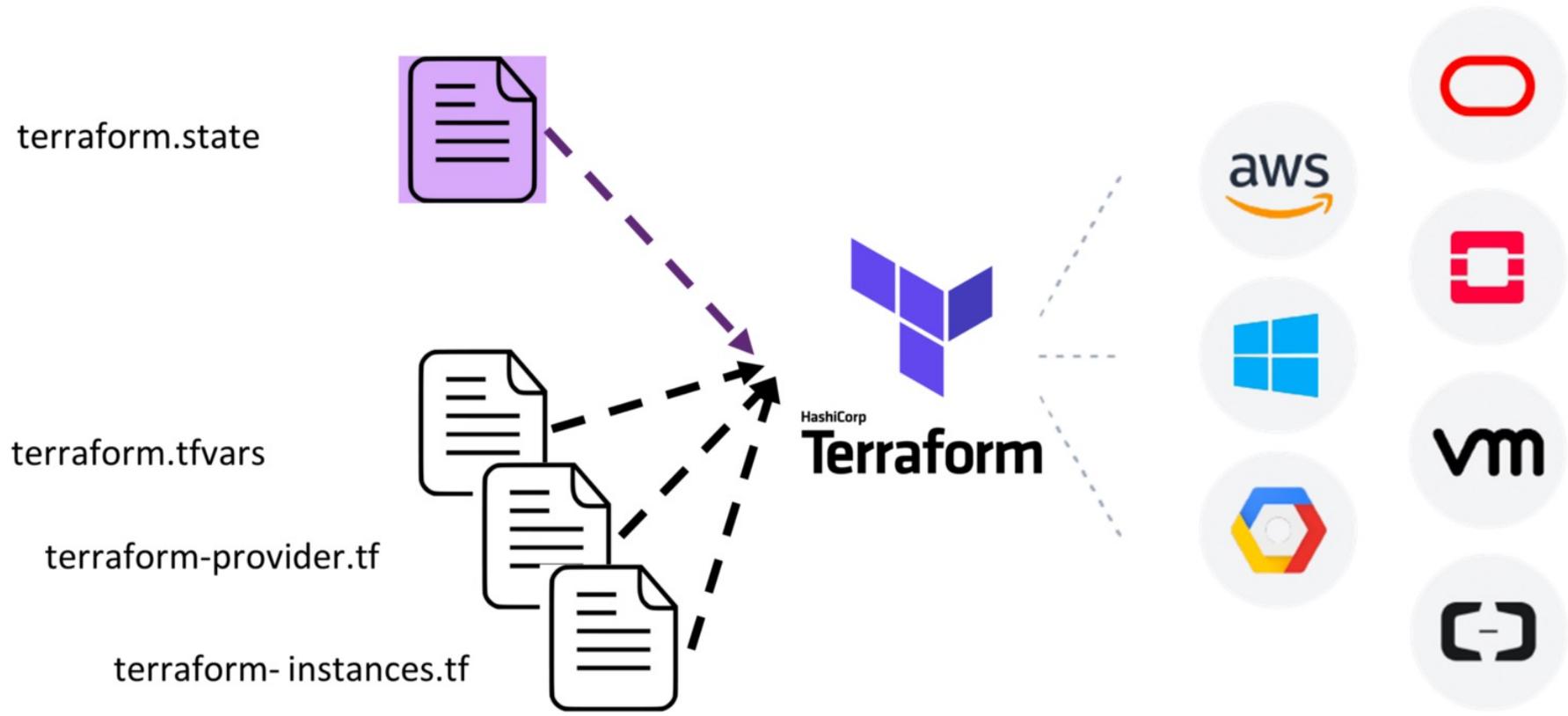
• <https://www.terraform.io/>

Azure Bicep

• <https://github.com/Azure/bicep>

Pulumi

• <https://www.pulumi.com>



DEMO: TERRAFORM

API CONSIDERATIONS

Monitoring

- AppInsights
- Health Checks

Discoverability

- Swagger/OpenAPI

Configuration

- Azure App Configuration
- .NET Core
- AppSettings.json

Caching

- Azure Cache (Redis)

Queuing

- Event Grid
- Azure Queue

Swagger/OpenAPI

- <https://swagger.io/>

Nswag

- <https://github.com/RicoSuter/NSwag>

Swagger Codegen

- <https://swagger.io/tools/swagger-codegen/>

QUESTIONS AND DISCUSSION

NEXT STEPS

Azure Pricing Review

- Process:
 - Review high-level Azure usage and architecture
 - Review typical business use cases
 - Review metrics and pricing history
- Outcomes:
 - Recommendations on a right-sized plan for your organization
 - Preliminary suggestions roadmap on how to utilize Azure
 - Tactical ideas on changes that could result in overall savings and higher reliability

Given the appropriate level of access to the necessary tenants and data (under NDA), the above outcomes can typically be accomplished during an engagement costing approximately \$2,000.

Contact us for more details

CONTACT INFORMATION

Kevin Grossnicklaus

President

ArchitectNow

kvgros@architectnow.net

[LinkedIn](#)

[@kvgros](#)

Alex Will

Chief Technology Officer

ArchitectNow

awill@architectnow.net

[LinkedIn](#)

[YouTube](#)

[@alwill_dotnet](#)

www.ArchitectNow.net

[@architectnow](#)

[LinkedIn](#)

Thank you!

info@architectnow.net
www.architectnow.net



ArchitectNow