AZURE DAY

Unleashing Extreme Scalability with Azure Functions

Chad Green

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Who is Chad Green?

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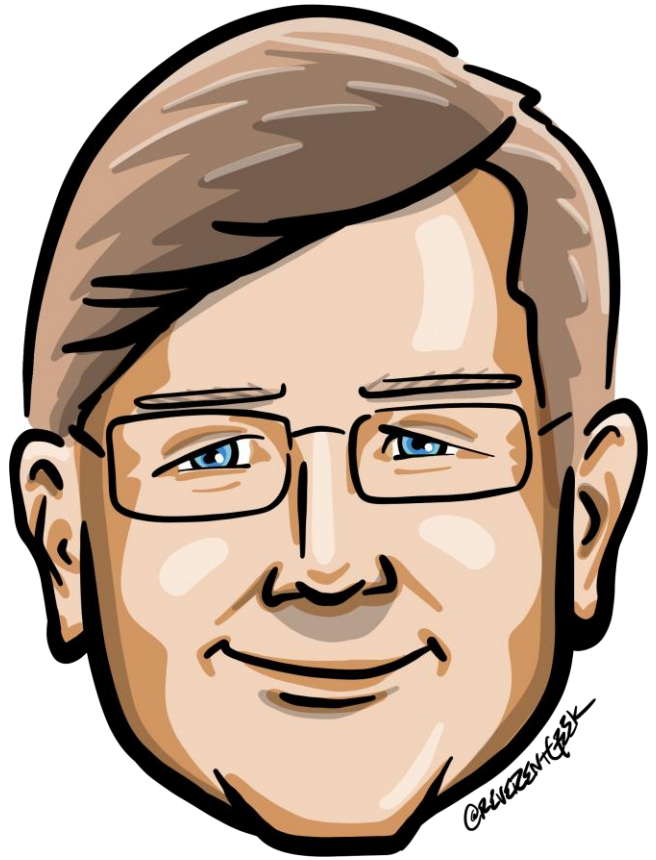
ChadGreen.com

ChadGreen & TaleLearnCode

ChadwickEGreen



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Unleashing Extreme Scalability with Azure Functions

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Azure Functions

Code

Events + data

Azure Functions Features

- Event-driven Triggers and Bindings
- Choice of Language
- Development Tools Integration
- Hosting Options
- Built-In Security and Compliance
- Flexible Pricing
- Scalability
- Serverless Workflow
- Open source

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Many Hosting Options

Consumption

Serverless

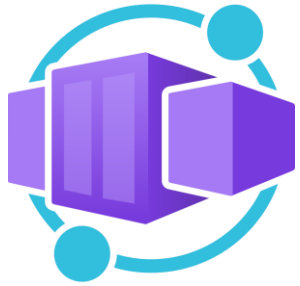
Premium

Sort of Serverless

Dedicated

App Service Plan

Container Apps



Consumption, Dedicated

App Service Environment

Network Isolation

Azure Stack

On Premises

Functions Runtime

Your Server

Azure IoT Edge

On Devices

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Many Hosting Options

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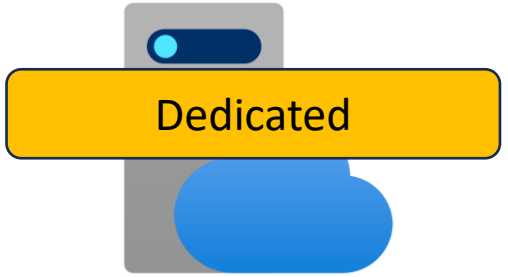
Dedicated

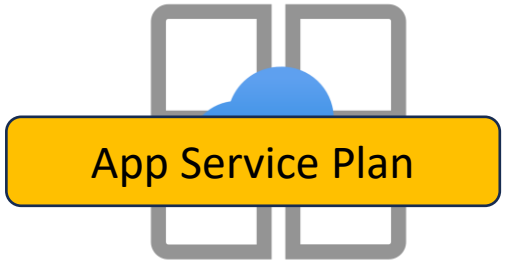


App Service Plan

Container Apps

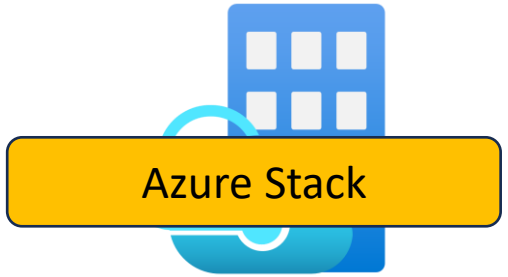
Consumption, Dedicated

App Service Environment



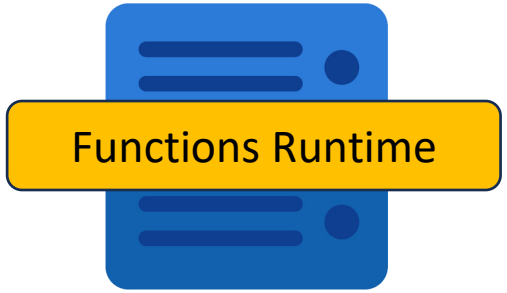
Network Isolation

Azure Stack



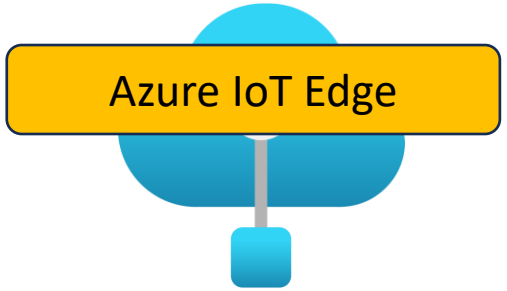
On Premises

Functions Runtime



Your Server

Azure IoT Edge



On Devices

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Many Hosting Options

- Consumption
- Premium
- Dedicated
- Container Apps
- App Service Plan
- Azure Stack
- Functions Runtime
- Azure IoT Edge

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Consumo di Flex

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Biggest Serverless Issue: Cold Starts

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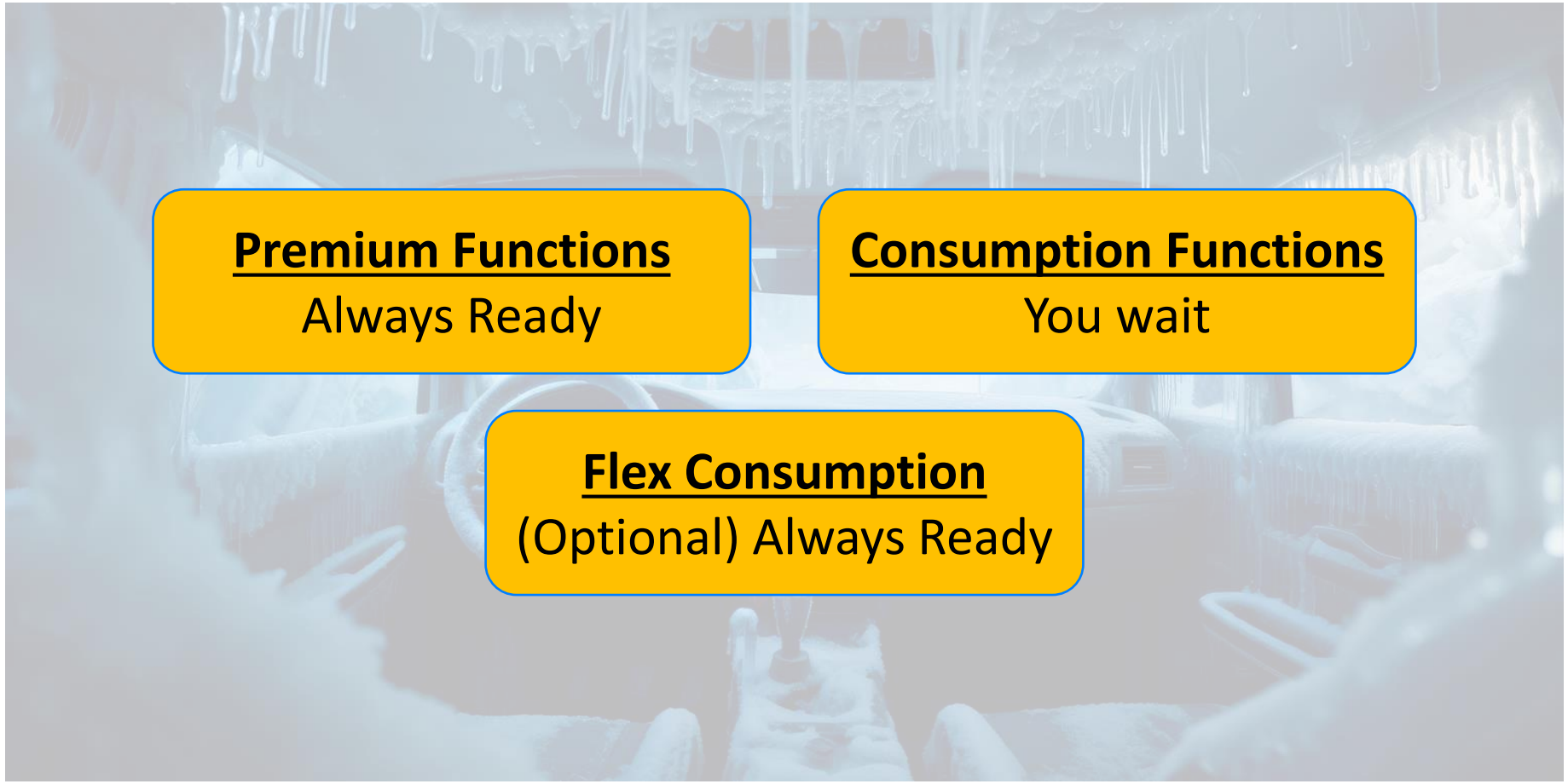
Cold Start Solutions



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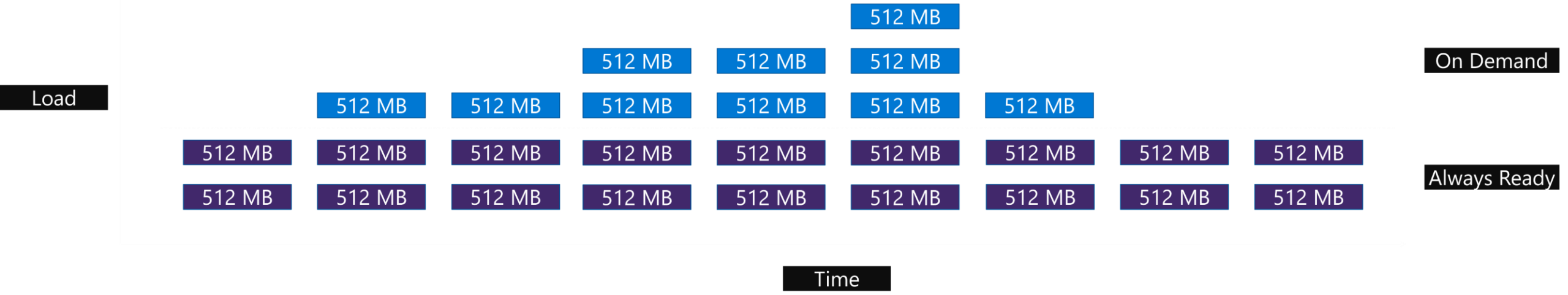
Always Ready Instances

- Choose instances that are always running
- Set minimum number of instances always ready



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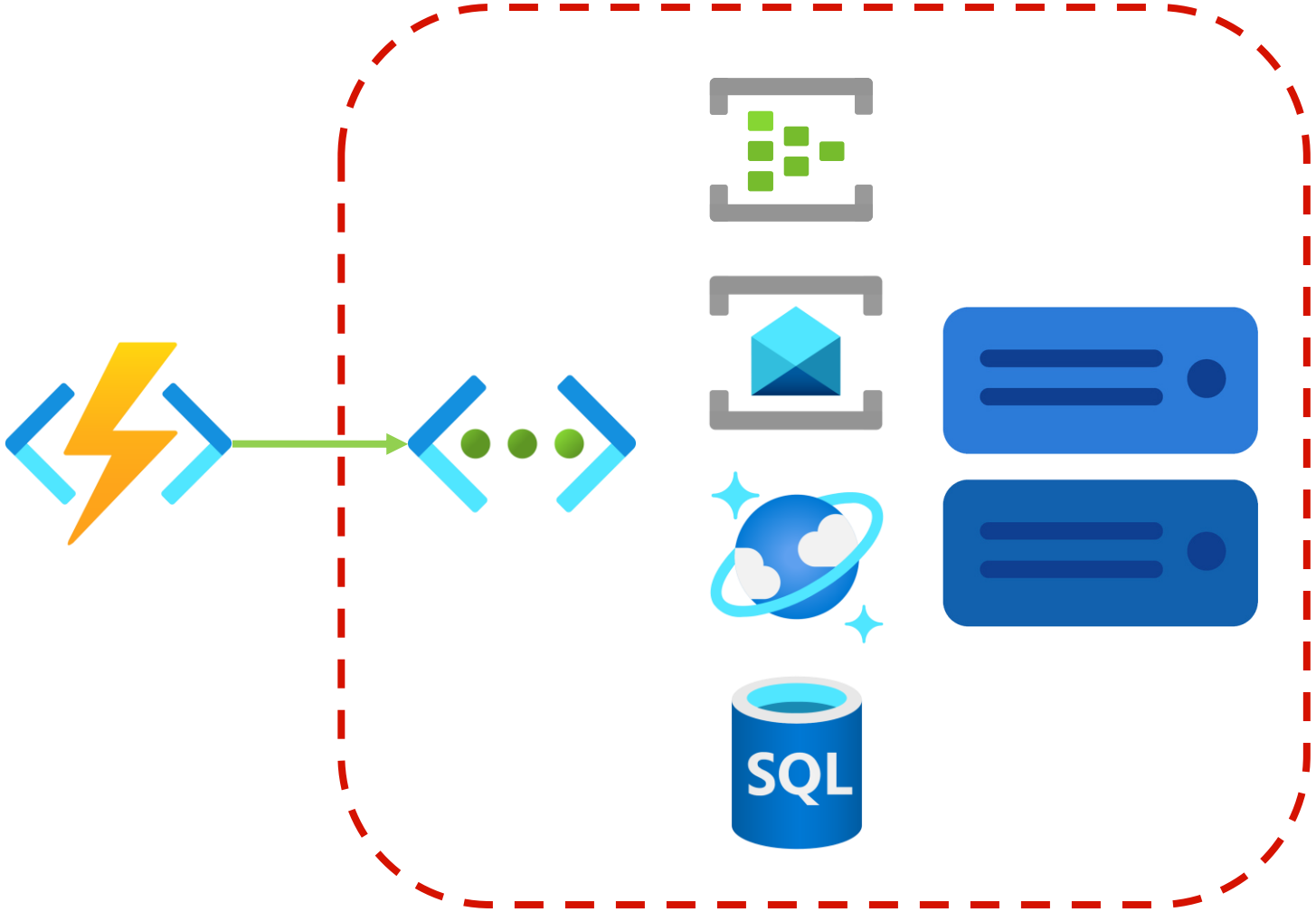
Virtual Network Support



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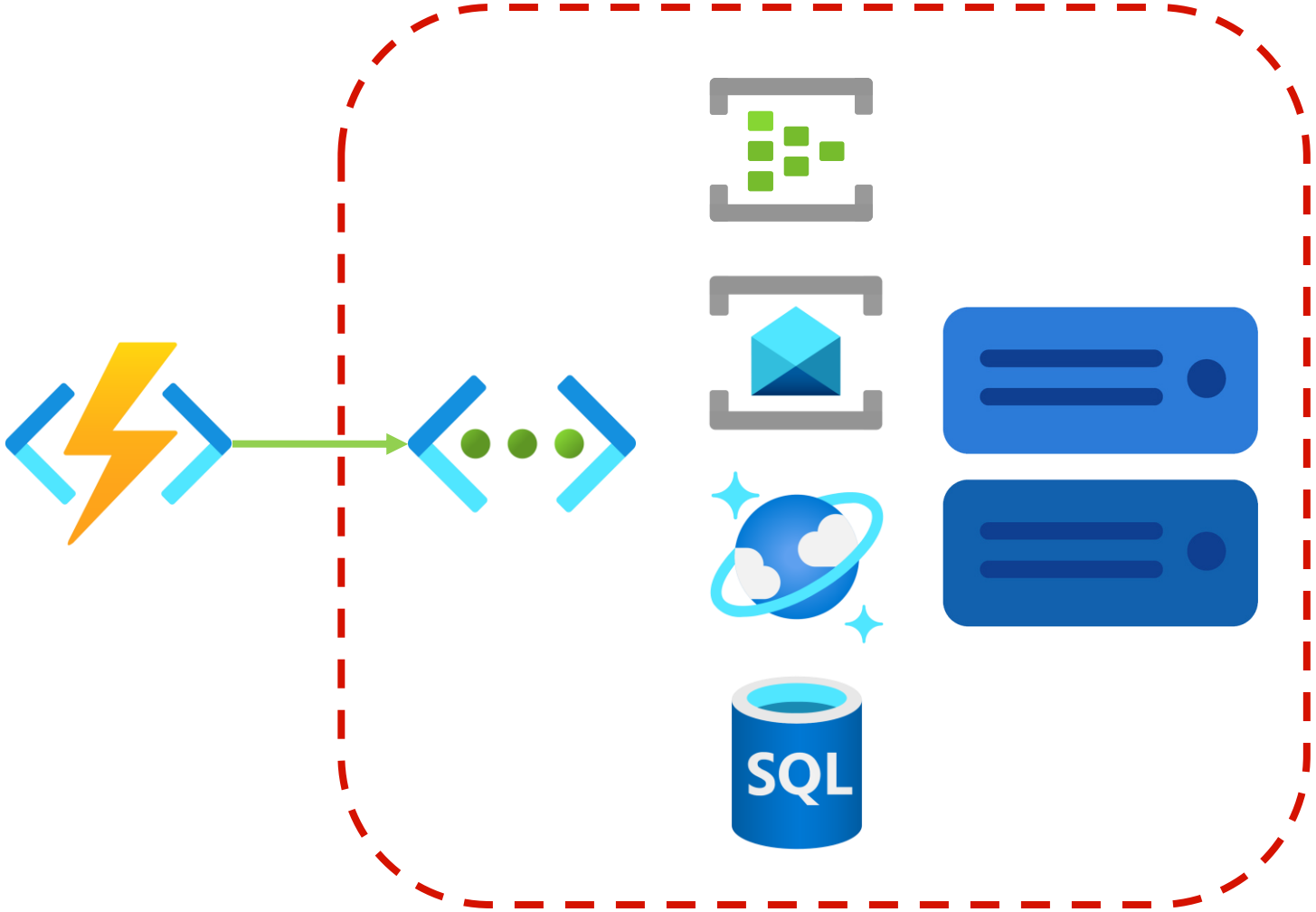
Virtual Network Support



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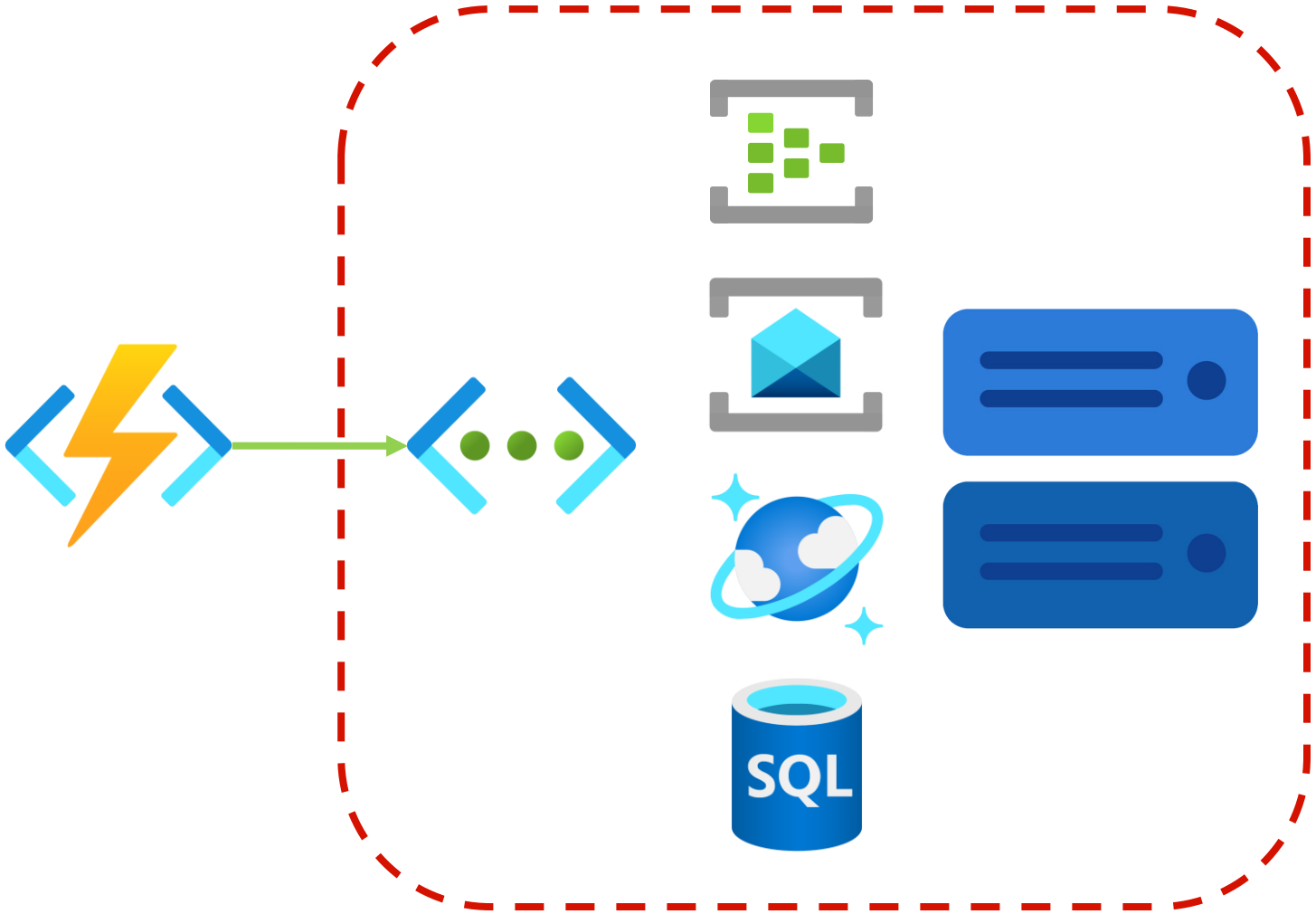

- Inbound Private Endpoints
- Virtual Network Integration
- Virtual Network Triggers (non-HTTP)
- Hybrid connections (Windows only)

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Instance Memory Choice

- 2048-Mb and 4096-Mb (more options coming)
- Default is 2048-Mb
- Change instance memory size at any time
- More memory means more can be done

Per-Instance Concurrency

- Number of parallel executions
- Can set concurrency level per instance
- Has a direct effect on how your app scales

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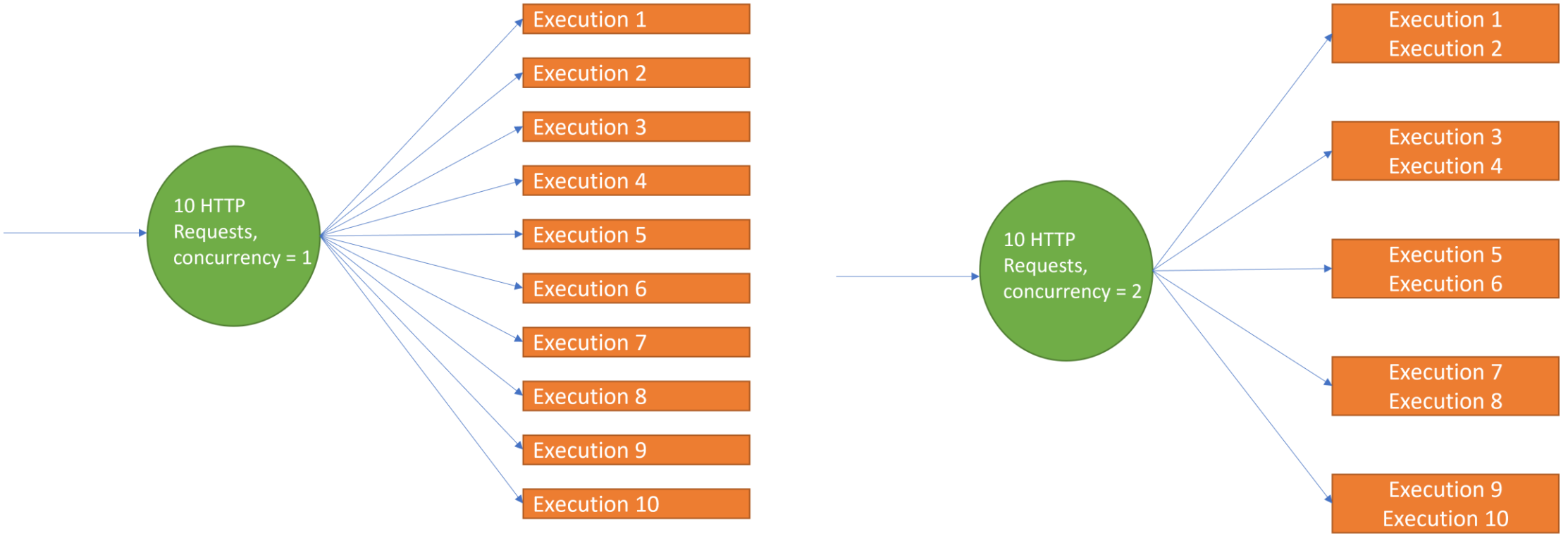
Per-Instance Concurrency



Per-Instance Concurrency Defaults

- Python – 1
- Other languages
  - 512-Mb: 4
  - 2048-Mb: 16
  - 4096-Mb: 32

Per-Function Scaling

- Deterministic way of scaling your app on a per-function basis
- No code changes
- Special cases: HTTP, Blob (Event Grid), and Durable trigger

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Per-Function Scaling

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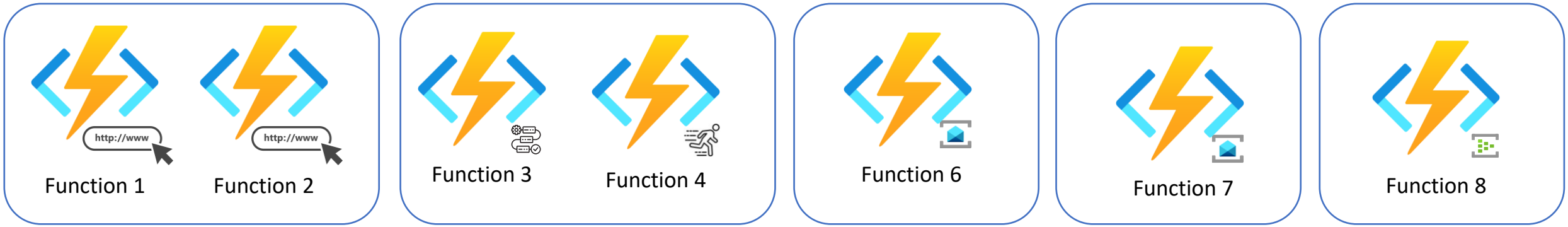

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Scale-Out Further

- Default is 100 instances
- Highest is 1000 instances
- Lowest is 40 instances

Region Subscription Memory Quota

512,000 MB per region per subscription

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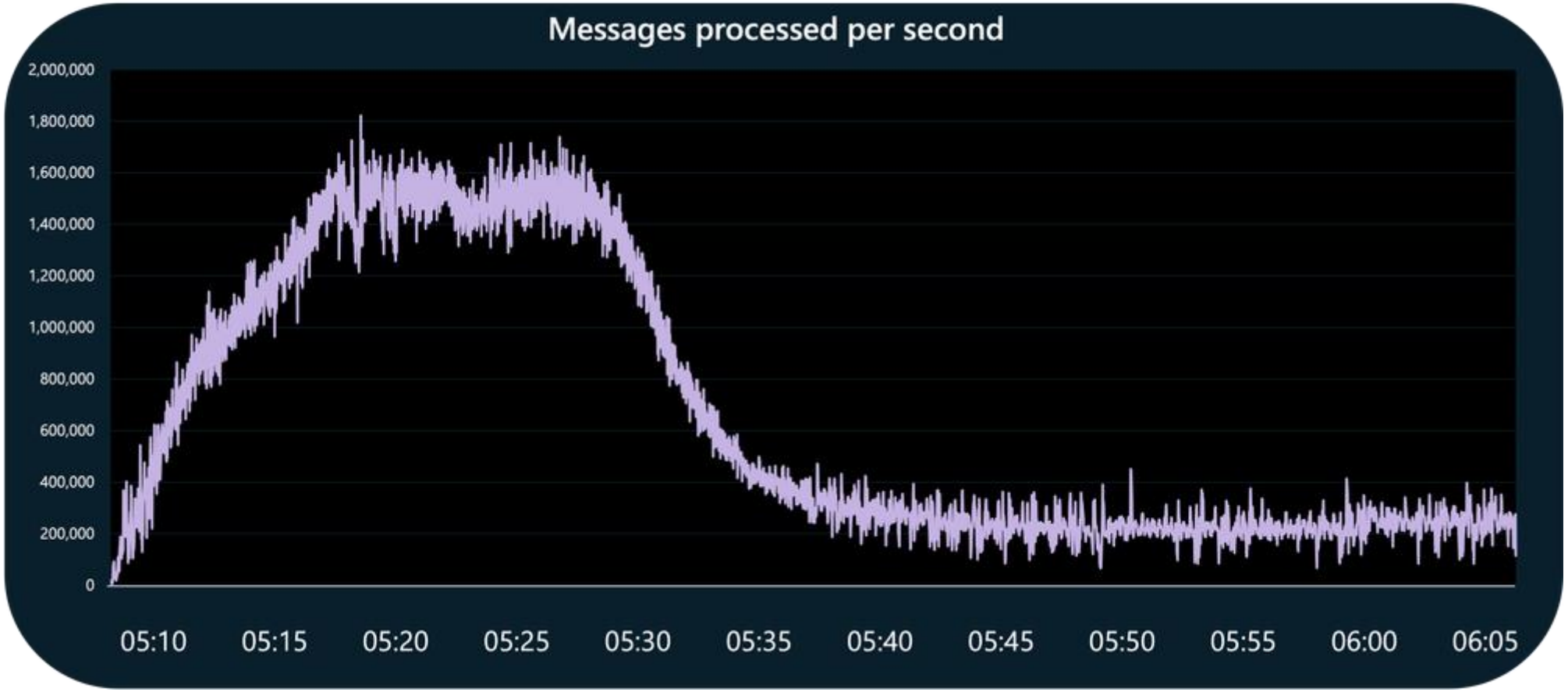
Extreme Scalability



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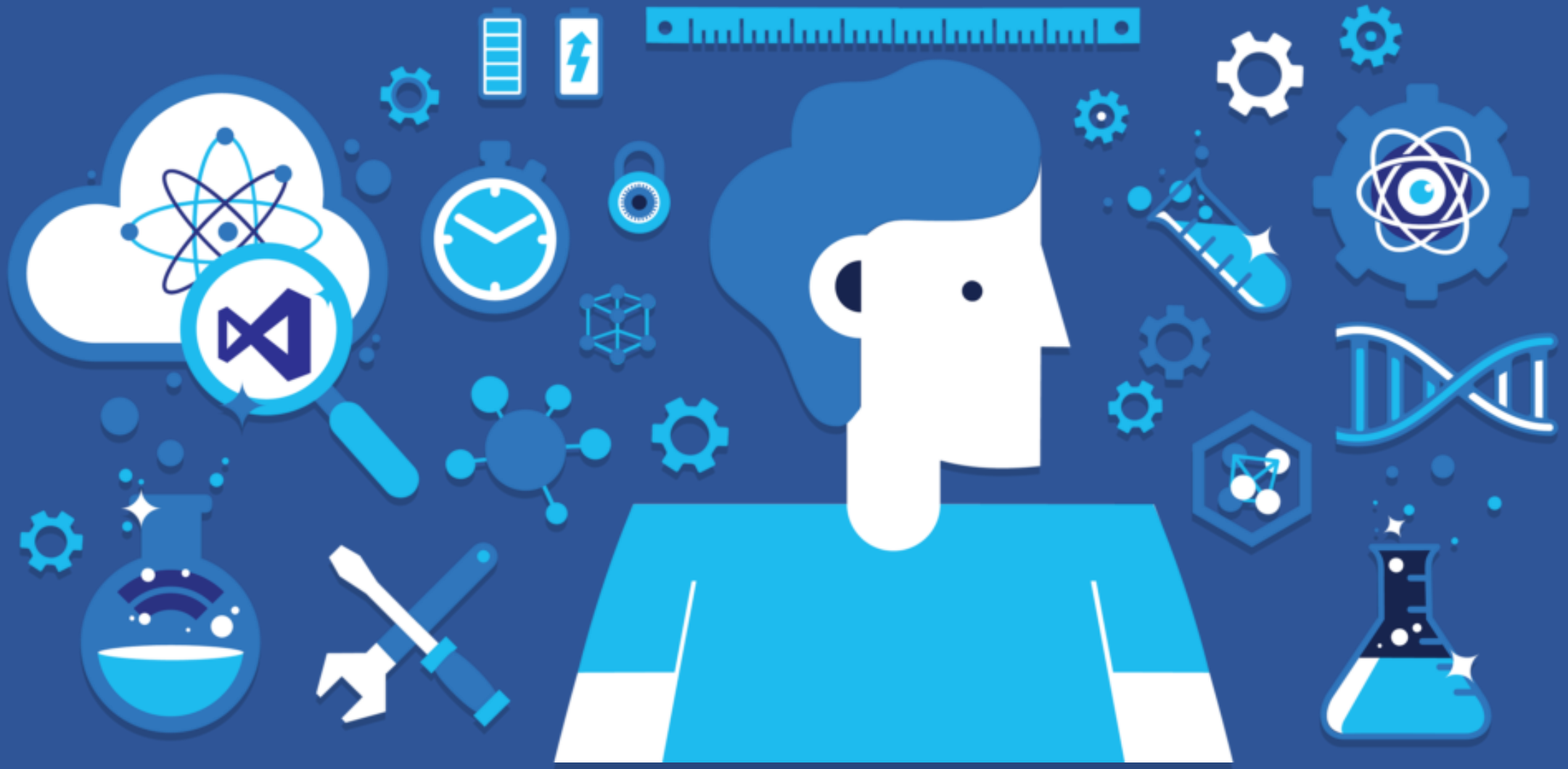
Demo



Even More Benefits

- Azure Load Testing Integration
- Open Telemetry Opt-In
- Long Execution Times

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Flex Consumption Features and Benefits

- Always Ready
- Virtual Network Support
- Instance Memory Choice
- Per-Instance Concurrency
- Per-Function Scaling
- Scale-Out Further
- Extreme Scalability
- Azure Load Testing Integration
- Open Telemetry Opt-In
- Long Execution Times

Pricing

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Pricing

On-Demand

Always Ready

Meter	Free Grant (per month)	Pay as you go
On Demand Execution Time	100,000 GB-s	$0.000019/GB-s
On Demand Total Executions	250,000 executions	$0.20 per million executions
Always Ready Baseline		$0.000004/GB-s
Always Ready Execution Time		$0.000011/GB-s
Always Ready Total Executions		$0.20 per million executions

North Europe Region

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Pricing

Azure Function Scenario

3 million executions per month; each execution using 512 MB and running for 1 second

Consumption: $18.00

Premium: $152.31

Flex Consumption (w/o Always Ready): $24.35

North Europe Region

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Pricing

Flex Consumption with Always Ready Scenario

3 million executions per month; each execution using 512 MB and running for 1 second; 1% of executions performed while idle

Consumption: $18.00

Premium: $152.31

Flex Consumption (w/o Always Ready): $24.35

Flex Consumption (with Always Ready): $40.03

North Europe Region

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Pricing

Actual Scenario

434k executions per month; each execution using 2048 MB and running for 400 milliseconds; VNet connectivity needed no Always Ready (cold starts acceptable)

Consumption: N/A

Premium: $155.27

Flex Consumption: $4.16

East US 2 Region

Considerazioni

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Considerations

- Not all triggers fully supported (yet)

Unsupported Triggers

Kafka

Azure SQL

SignalR

Not-Fully Supported

Blob (only supports the Event Grid source)

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Considerations

- Not all triggers fully supported (yet)
- Not all regions are supported (yet)

Flex Consumption Regions

- East US
- North Europe
- Southeast Asia
- East Asia
- East US 2
- South Central US
- Australia East
- North Central US
- West US 2
- UK South
- West US 3
- Sweden Central

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Considerations

- Not all triggers fully supported (yet)
- Not all regions are supported (yet)
- Deployment options limited (currently)

Unsupported Deployment Methods

- Azure DevOps Task (AzureFunctionApp@2)
- GitHub Actions (function-action@v1)
- Deployment Slots

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Considerations

- Not all triggers fully supported (yet)
- Not all regions are supported (yet)
- Deployment options limited (currently)
- Scaling limitations (currently)

Scaling Limitations

- Lowest maximum scale is 40
- Highest maximum scale is 1000

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Considerations

- Not all triggers fully supported (yet)
- Not all regions are supported (yet)
- Deployment options limited (currently)
- Scaling limitations (currently)
- Limited Support – Preview Functionality

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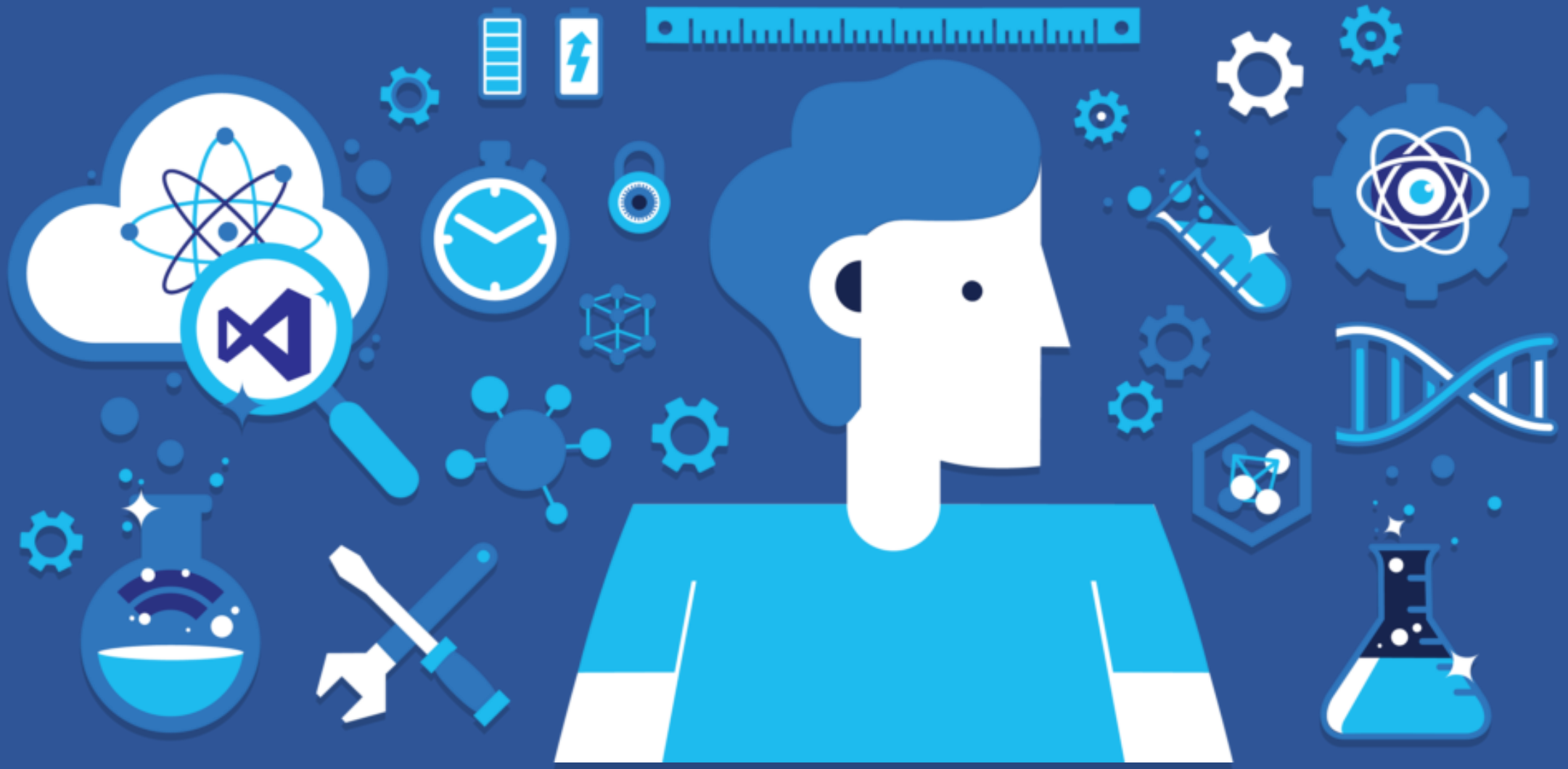
Demo



Create a Flex Consumption Function App

az functionapp list-flexconsumption-locations --output table

az group create --name rg-DemoPrep-demo-use2 --location eastus2

az storage account create --name stdemoprepdemouse2 --location eastus2 --resource-group rg-DemoPrep-demo-use2 --sku Standard_LRS --allow-blob-public-access false

az functionapp create --resource-group rg-DemoPrep-demo-use2 --name func-DemoPrep-demo-use2 --storage-account stdemoprepdemouse2 --**flexconsumption-location** eastus2 --runtime dotnet-isolated --runtime-version 8.0

Deploy the Function App to Azure

func azure functionapp publish func-DemoPrep-demo-use2

Enable Virtual Network Integration

az network vnet create --name vnet-DemoPrep-demo-use2 --resource-group rg-DemoPrep-demo-use2 --address-prefix 10.0.0.0/16 --subnet-name snet-DemoPrep-demo-use2 --subnet-prefixes 10.0.0.0/24

az functionapp vnet-integration add --resource-group rg-DemoPrep-demo-use2 --name func-DemoPrep-demo-use2 --vnet vnet-DemoPrep-demo-use2 --subnet snet-DemoPrep-demo-use2

Configure Instance Memory

az functionapp scale config set --resource-group rg-DemoPrep-demo-use2 --name func-DemoPrep-demo-use2 --instance-memory 4096

Set the Always Ready Instance Count

az functionapp scale config always-ready set --resource-group rg-DemoPrep-demo-use2 --name func-DemoPrep-demo-use2 --settings http=10

Set HTTP Concurrency Limits

az functionapp scale config set --resource-group rg-DemoPrep-demo-use2 --name func-DemoPrep-demo-use2 --trigger-type http --trigger-settings perInstanceConcurrency=10

Decisioni

Unleashing Extreme Scalability with Azure Functions

Hosting Decisions

Consumption

Flex Consumption

Premium

Dedicated

Container Apps

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Hosting Decisions

Consumption | Flex Consumption | Premium | Dedicated | Container Apps

Benefits

- Pay only when your functions are running (pay-as-you-go)
- True serverless hosting
- Automatic scaling during high load

Use case

Ideal for sporadic workloads with varying demand

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Hosting Decisions

Consumption | **Flex Consumption** | Premium | Dedicated | Container Apps

Benefits

- High scalability with compute choices
- Support virtual networking for added security
- Specify pre-provisioned instances to reduce cold starts
- Connects to virtual networks

Use case

- When you need more control over concurrency and what to pay-as-you-go
- When you need VNet support for sporadic workloads

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Hosting Decisions

Consumption | Flex Consumption | **Premium** | Dedicated | Container Apps

Benefits

- Automatically scales based on demand using prewarmed workers
- Suitable for continuous or nearly continuous workloads
- Connects to virtual networks

Use case

- Multiple functions apps on the same plan with event-driven scaling
- Need for more compute power
- When you need VNet support for high-use workloads

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Hosting Decisions

Consumption | Flex Consumption | Premium | **Dedicated** | Container Apps

Benefits

- Dedicated compute resources for your app
- Ideal for complex applications with customization needs
- Fully utilize existing App Service Plans

Use case

- Get full utilization of an existing App Service Plan
- Long-running scenarios where Durable Functions cannot be used

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Hosting Decisions

Consumption | Flex Consumption | Premium | Dedicated | **Container Apps**

Benefits

- Run your function app in a container
- Fully managed environment
- Dapr Support

Use case

- Mixing with other Container Apps and/or need Dapr support
- Migrating code execution form on-premises or legacy apps

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Thank you!

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