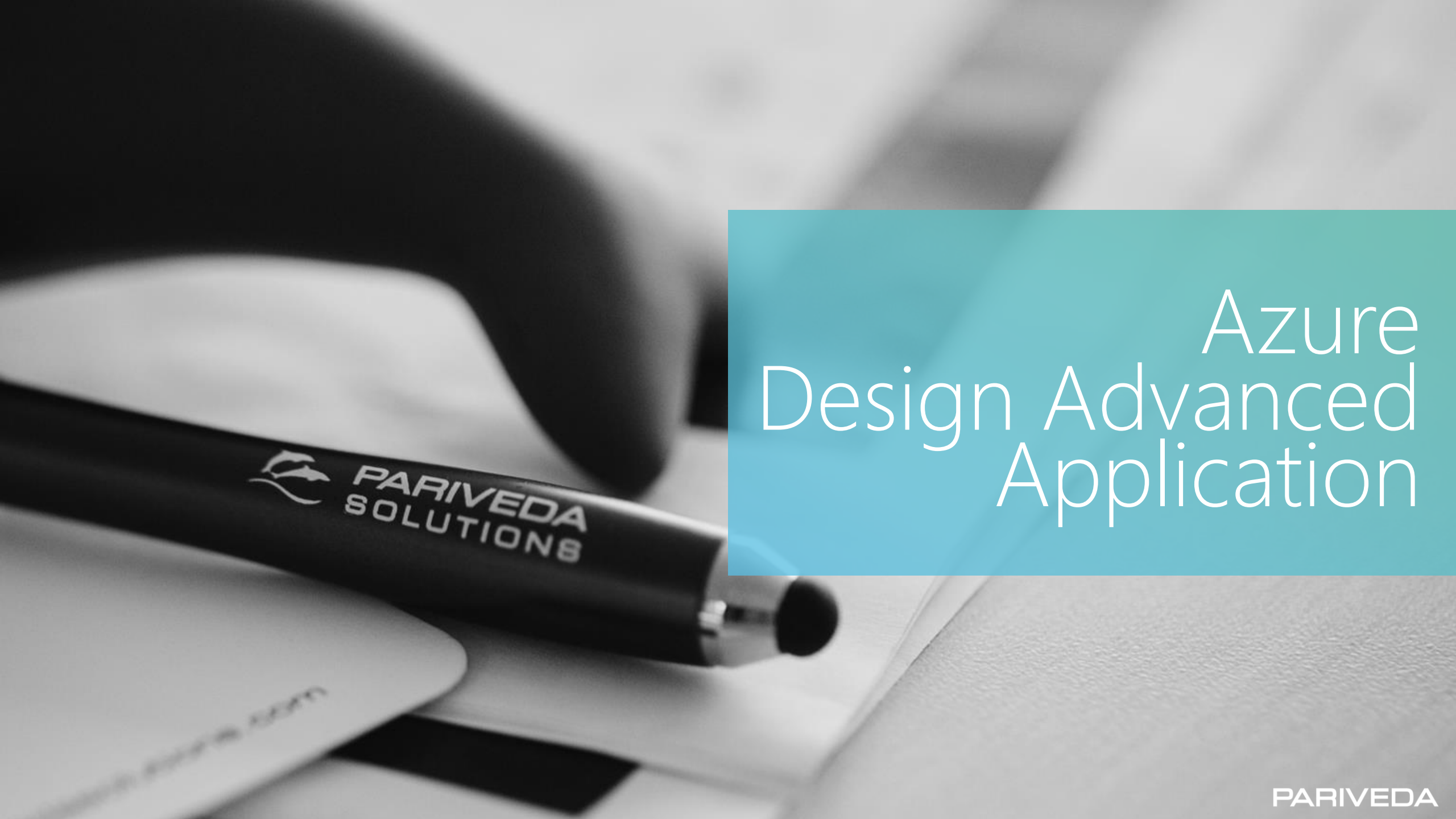

Azure Design Advanced Application

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Pariveda Overview

Pariveda Solutions Inc. is a leading management consulting firm delivering strategic services and technology solutions. Our focus is simple. Start with the right people, deliver consistent value and partner enthusiastically with our clients. We grow and deploy talented people to solve technical and strategic challenges. We are passionate about delivering exceptional value to our clients.

Our Clients

Pariveda solves the complex problems of clients ranging from Fortune 100 to Global 2000 to startup companies and spanning multiple industries.

Clients partner with us for our high-caliber combination of technology and business problem-solving experts, our high-quality delivery consistency and our focus on building lifetime relationships..

Key Details

ON-SHORE ONLY
100% on-shore – in-person matters

TRUSTED RELATIONSHIPS
85% repeat business

SCALABLE HOT-SQUADS
Deliver projects + upskill your people + burst as needed

Our Locations

UBER-FLEXIBLE PEOPLE
We adapt fast – our biggest differentiator

400

BUSINESS TRANSFORMATION
Valued by over 400 clients

Our Solutions

- Strategy
- Mobility
- Cloud
- Data
- Portals & Collaboration
- CRM
- Custom Software
- Enterprise Integration
- User Experience

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Design Advanced Applications

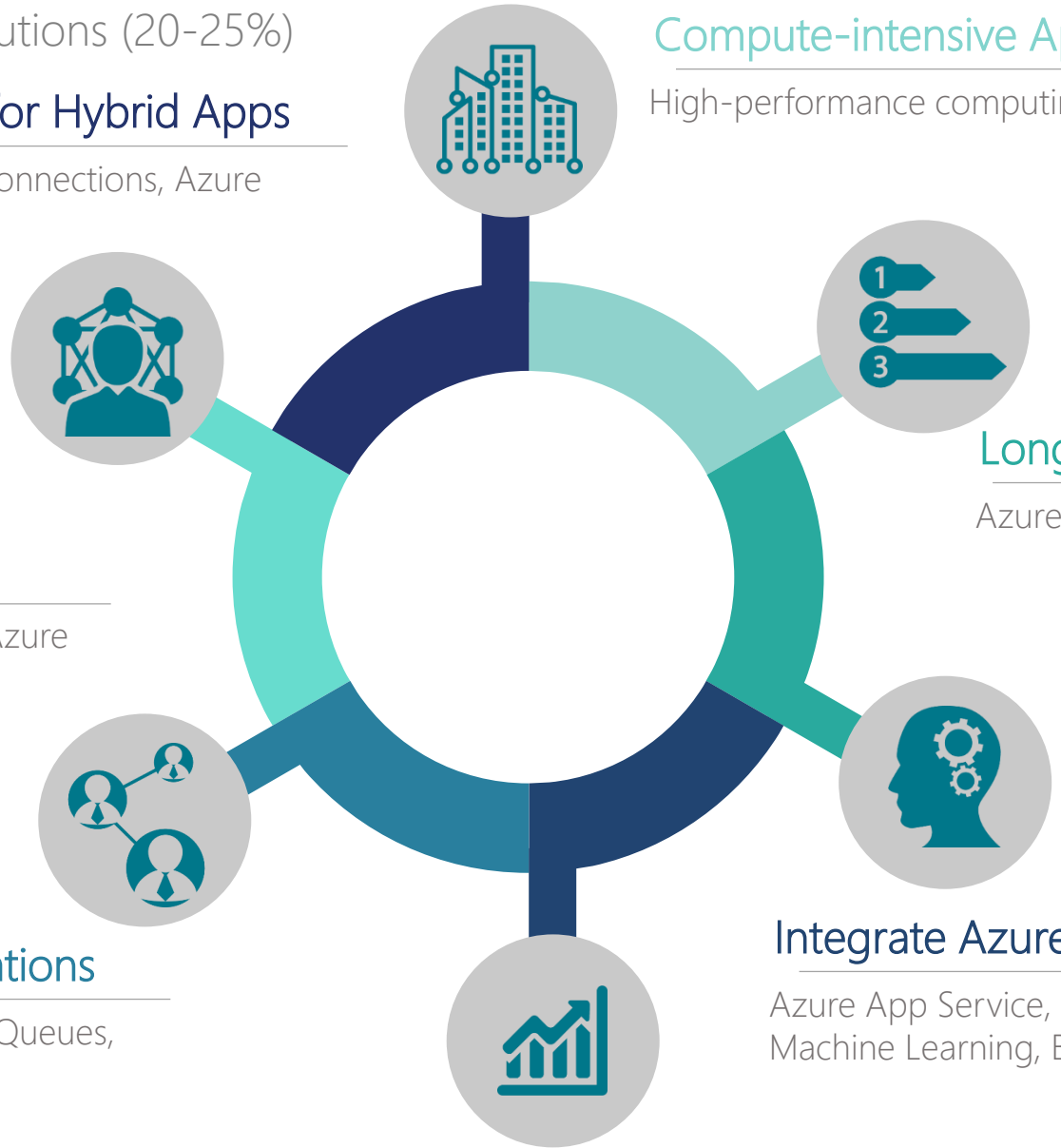
70-534 Architecting Azure Solutions (20-25%)

Design Connectivity for Hybrid Apps

Service Bus Relay, Hybrid Connections, Azure Web App VPN

Compute-intensive Applications

High-performance computing (HPC)



Long-running Applications

Azure Batch, Azure Scheduler

Applications for Background Processing

Azure Batch, Azure Web Jobs, Azure Functions, Azure Scheduler

Integrate Azure Services in a Solution

Azure App Service, API Management, Service Bus, Machine Learning, Big Data, Azure Media/Search Services

Implement Messaging Applications

Queue-centric pattern, Azure Storage Queues, Azure Service Bus Queues

Real-world Applications

Our experience

Solution A

- Build Big Data Platform
- Leverage Machine Learning
- Predictive Analytics
  - Customer Segmentation
  - Customer Churn Prediction
  - Forecast Energy & Power Demand
- Mobile App, API Management & Power BI
- Remote Battery Control

Solution B

- Build Web API
- Create multi-tenant, multi-client application
  - Web App
  - Azure Mobile Services - Xamarin
- Integrate CI/CD DevOps

Hybrid Applications

Why would you want external applications to connect to a server inside your network?

Small External Use Case

The external application might be a small use case when compared to the on premise use case

Security

You may have security requirements that prevent you from deploying certain application to a public cloud.

Part of a Large Network

It may not make sense to migrate a single application when it is part of a large on premise network

How You Can Connect

Three Options

1

Service Bus Relay

- Runs in the cloud
- Accepts the request (WCF service call) and passes the request to the WCF service running inside your network
- Very selective on what traffic that you allow onto your network

2

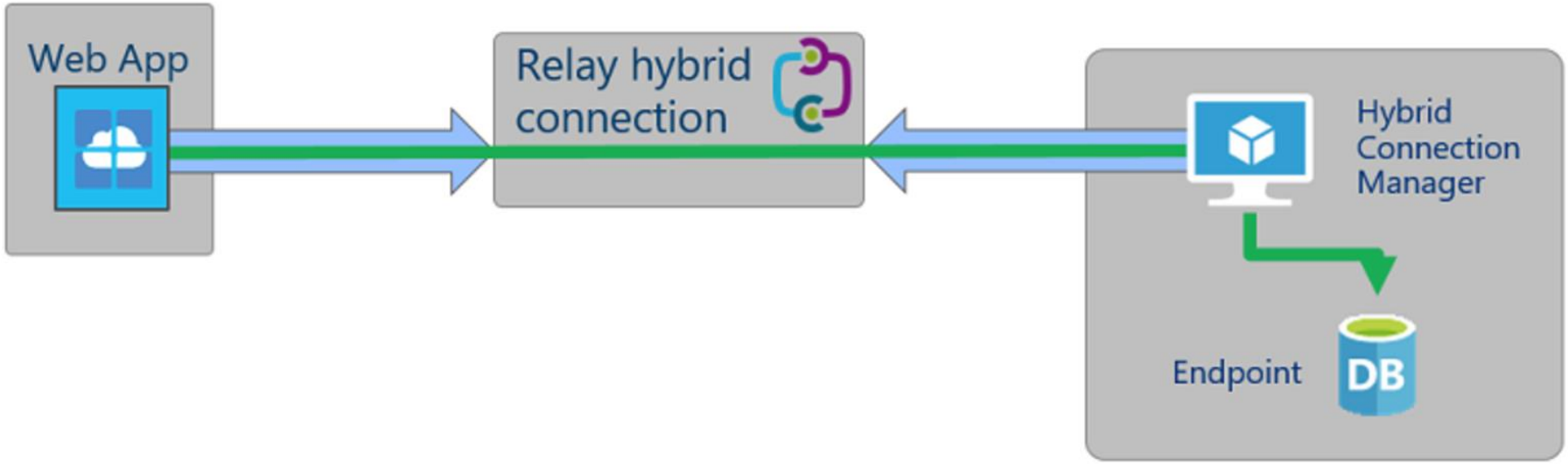
BizTalk API (Deprecated)

- Your application is written in any language that Azure supports
- Applications moved from a local network to the cloud without changing a connection string
- Much easier to move these API and services into the cloud because no connection string changes are required

3

Azure App Service Hybrid Connection

- Apps can securely access on premises systems and services securely
- the feature does not require an internet accessible endpoint
- it is quick and easy to set up
- each hybrid connection matches to a single host:port combination which is an excellent security aspect
- it normally does not require firewall holes as the connections are all outbound over standard web ports
- because the feature is network level that also means that it is agnostic to the language used by your app and the technology used by the endpoint



Azure App Service Hybrid Connection

Compute Intensive Applications

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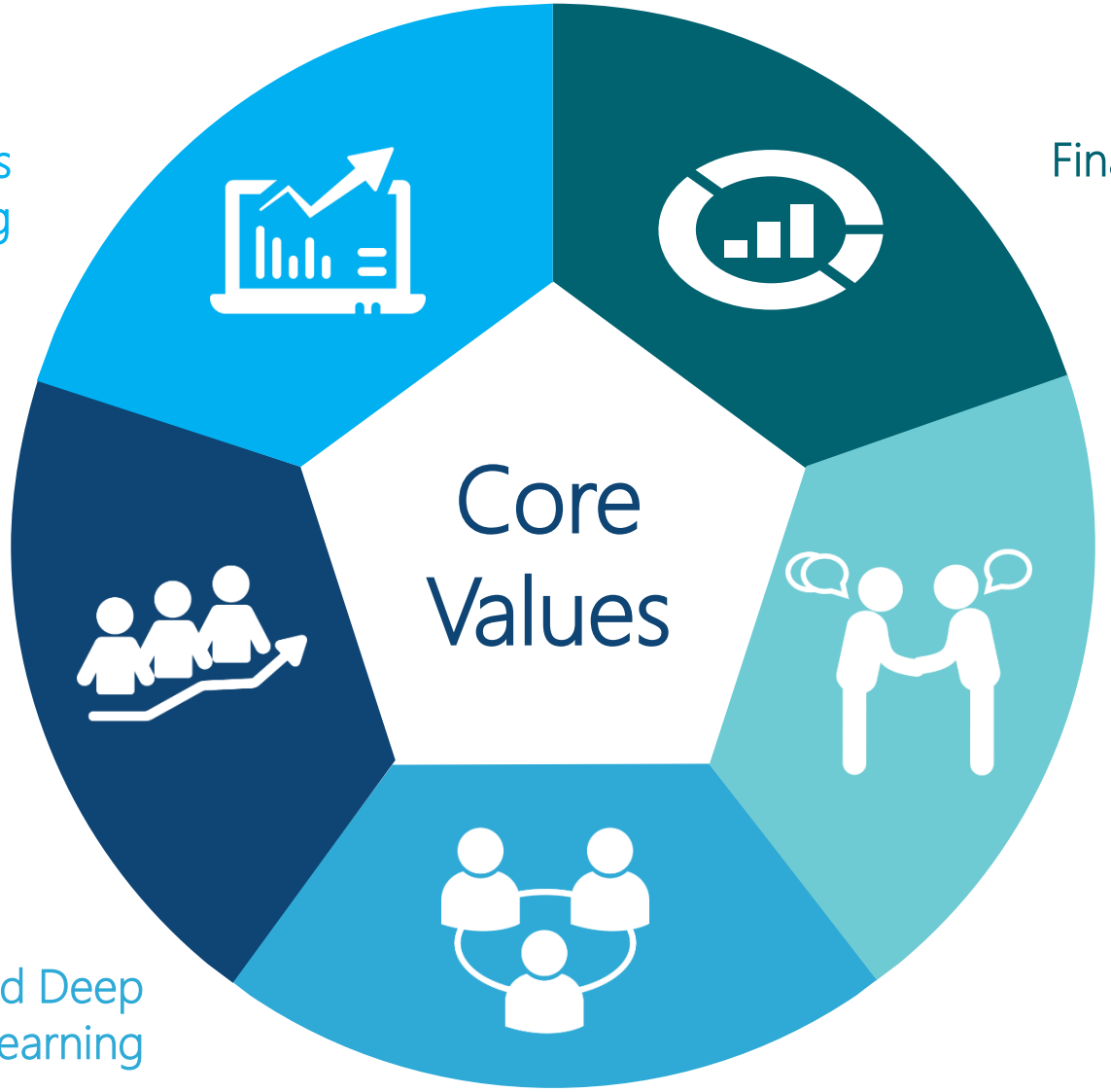
Compute Intensive Use Cases



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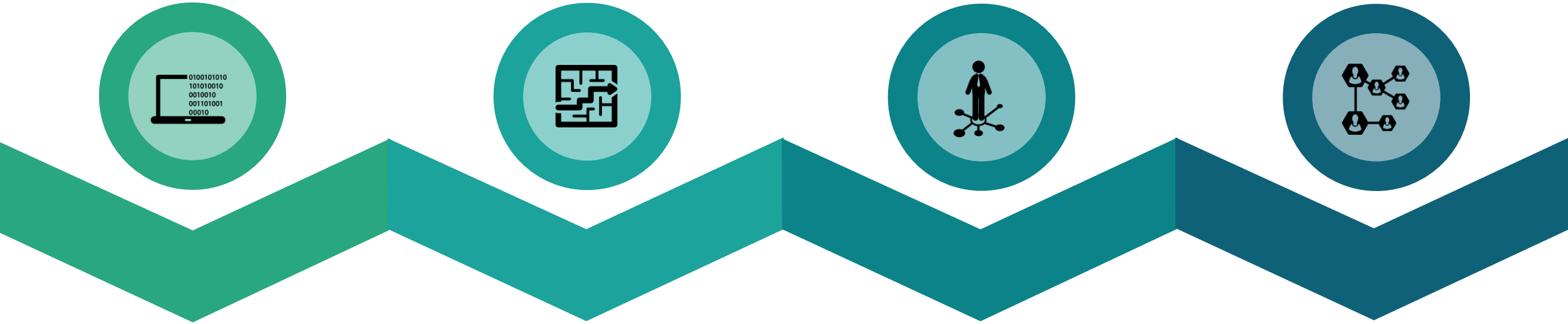
Changing Big Compute Environment



HPC Pack On-premise

- On-premises Windows clusters
- Easy scaling to reduce runtimes
- Job scheduling and management
- Compute node provisioning

HPC Pack Hybrid

- On-premises Windows clusters
- Easy scaling to reduce runtimes
- Job scheduling and management
- Compute node provisioning

HPC Pack IaaS

- Deploy cluster all in cloud
- Move existing applications
- Support projects and testing
- Gallery images and scripts to deploy
- Flexible VM configuration

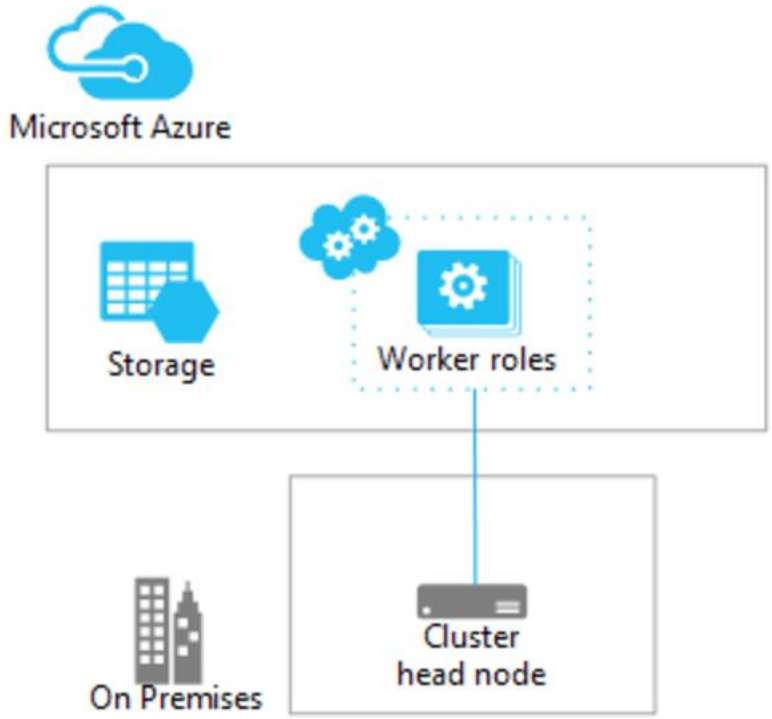
Azure Batch PaaS

- Native cloud scheduler
- Devops, not infrastructure management
- Small to very large deployments
- Elasticity with auto-scale
- Use within a service or to offer SaaS

High Performance Computing (HPC) Cluster

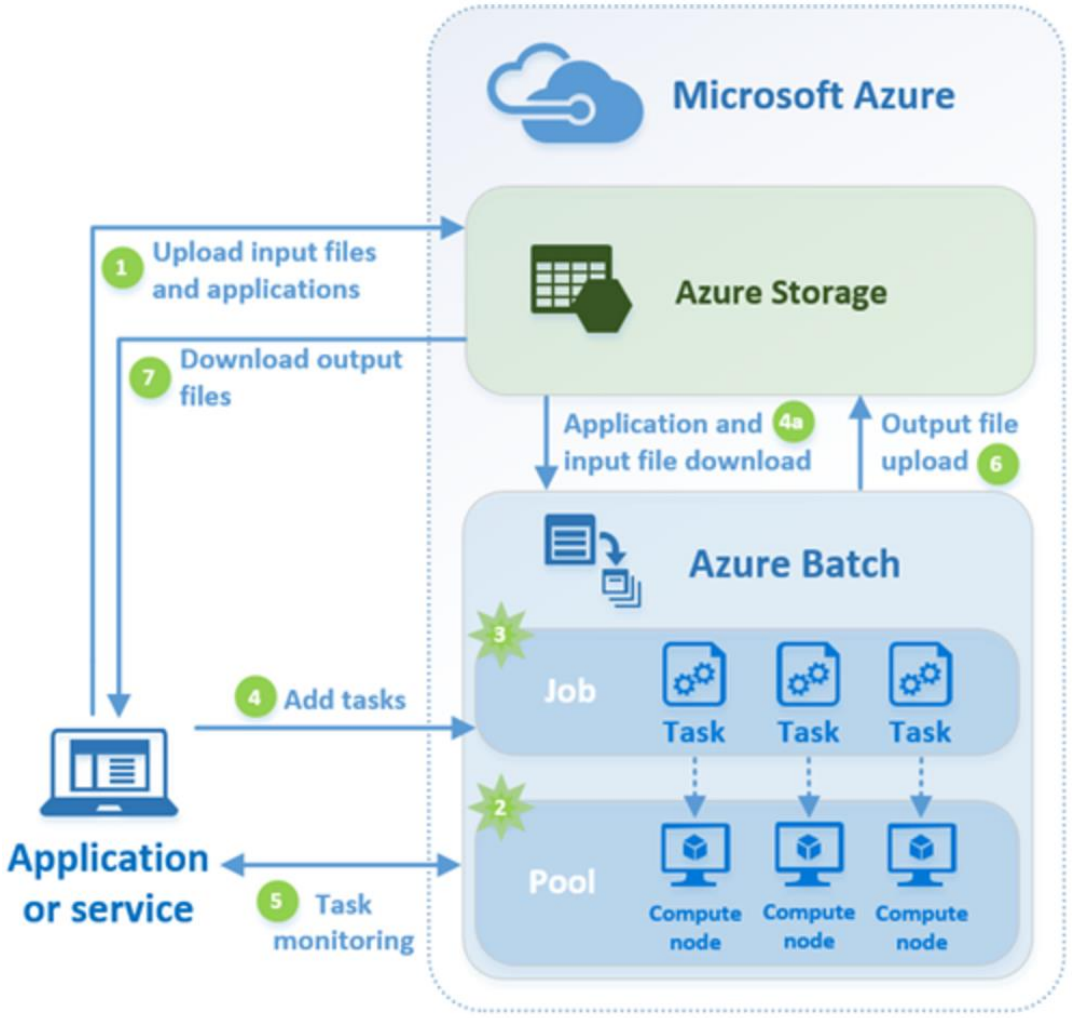
Head Node

- Central place that accepts work
- Controls the distribution of jobs
- Tasks happen on clusters
- Head node can be hosted on-premise or in the cloud
- Must install HPC pack on head node



Azure Batch

1. Upload input files
2. Create a Batch pool of compute nodes
3. Create a Batch Job
4. Add Tasks to the job
5. Monitor the job
6. Output file upload to Azure Storage
7. Download output files



Implementing Messaging Applications

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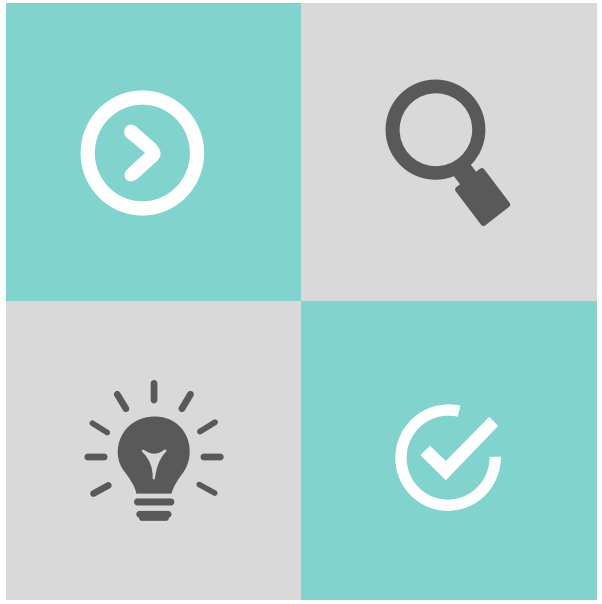
Why Use Messaging Applications

Background



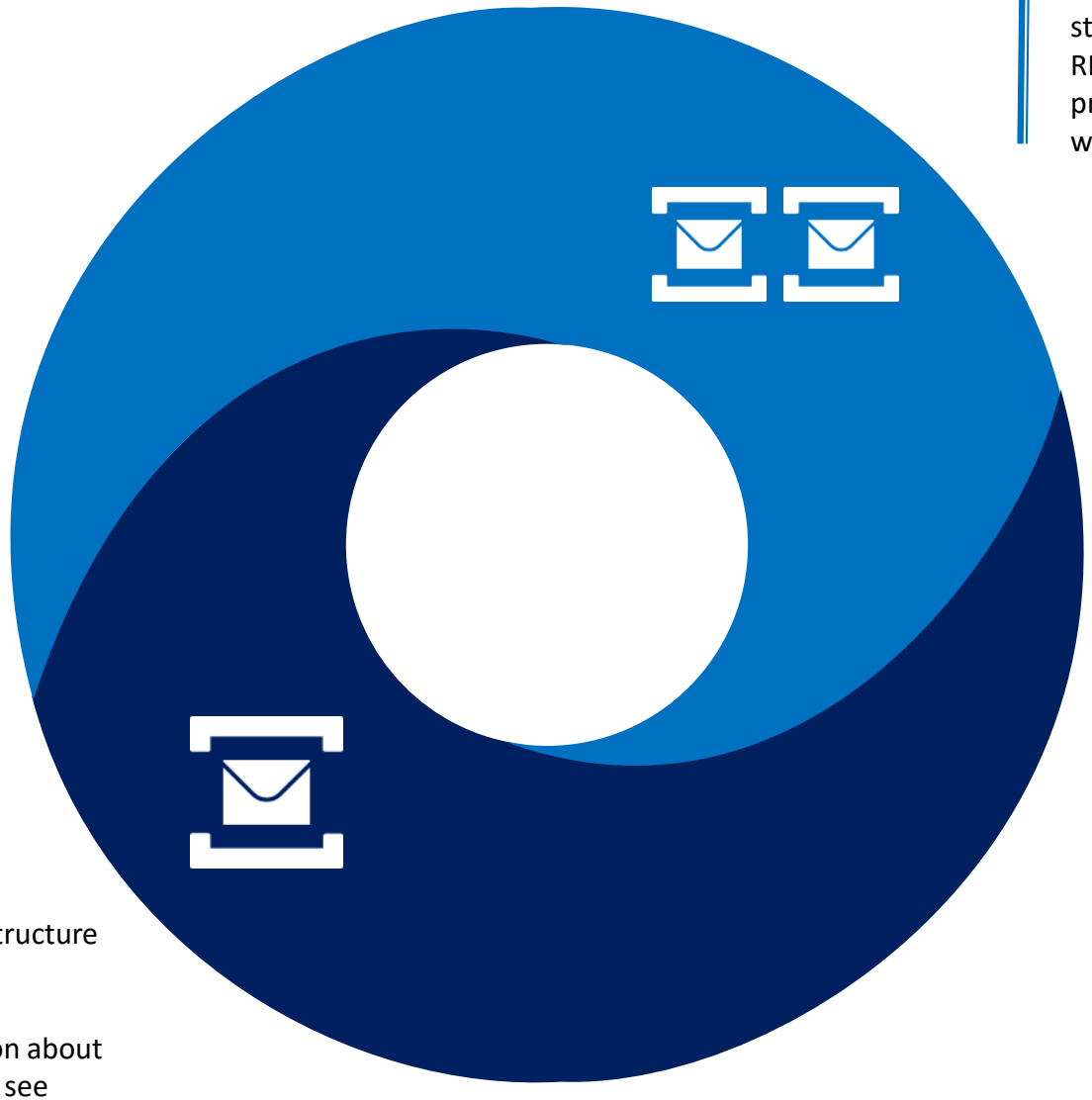
Solution & Benefits

Designing “Cloud Native” applications is different from your traditional monolith application. In order to take advantage of the cloud you need to design in scalability. Messaging application play a key role in enabling scale ability

Two main options for messaging applications

Azure Storage Queue

are part of the Azure storage infrastructure, feature a simple REST-based GET/PUT/PEEK interface, providing reliable, persistent messaging within and between services



Service Bus

part of a broader Azure messaging infrastructure that supports queuing as well as publish/subscribe, and more advanced integration patterns. For more information about Service Bus queues/topics/subscriptions, see the overview of Service Bus.

Azure Storage Queue Service Concepts

URL format: Queues are addressable using the following URL format:
http://<storage account>.queue.core.windows.net/<queue>

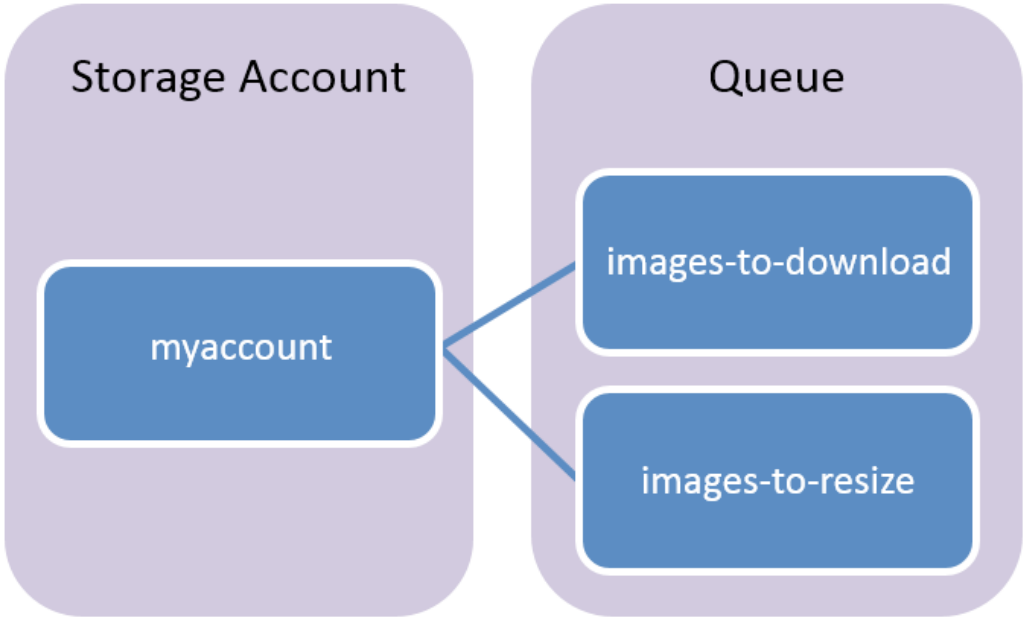
The following URL addresses a queue in the diagram:

http://myaccount.queue.core.windows.net/images-to-download

Storage Account: All access to Azure Storage is done through a storage account.

Queue: A queue contains a set of messages. All messages must be in a queue. Note that the queue name must be all lowercase.

Message: A message, in any format, of up to 64 KB. The maximum time that a message can remain in the queue is 7 days



Azure Service Bus Key Concepts

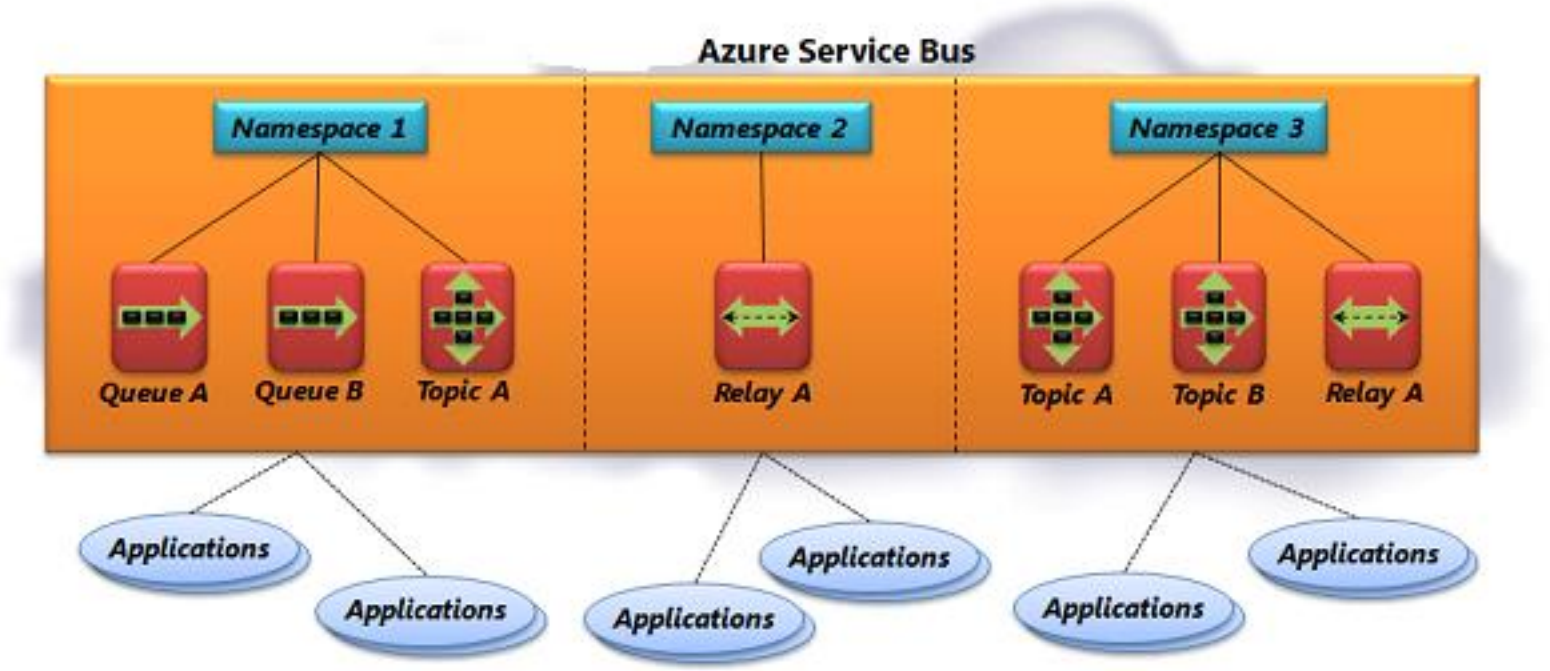
Namespace: An identifier for a grouping of communication mechanisms

Communication Mechanism:

- **Queues**, allow one-direction communication. Each queue acts as an intermediary (sometimes called a broker) that stores sent messages until they are received, Each message is received by a single recipient
- **Topics**, provide one-directional communication using subscriptions - a single topic can have multiple subscriptions. (pub sub). Like a queue, a topic acts as a broker, but each subscription can optionally use a filter to receive only messages that match specific criteria
- **Relays**, provide bi-directional communication. Unlike queues and topics, a relay doesn't store in-flight messages; it's not a broker. Instead it just passes them on to the destination application

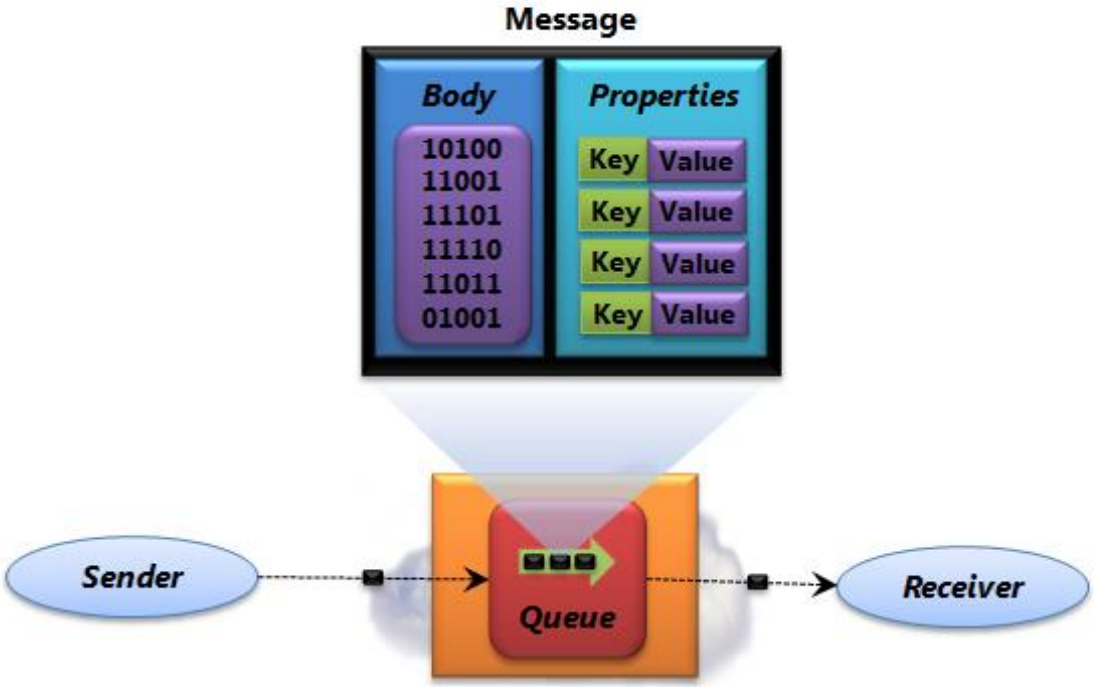
The combination of a namespace and a communication mechanism creates an unique identifier that can be used by an application

Azure Service Bus Example



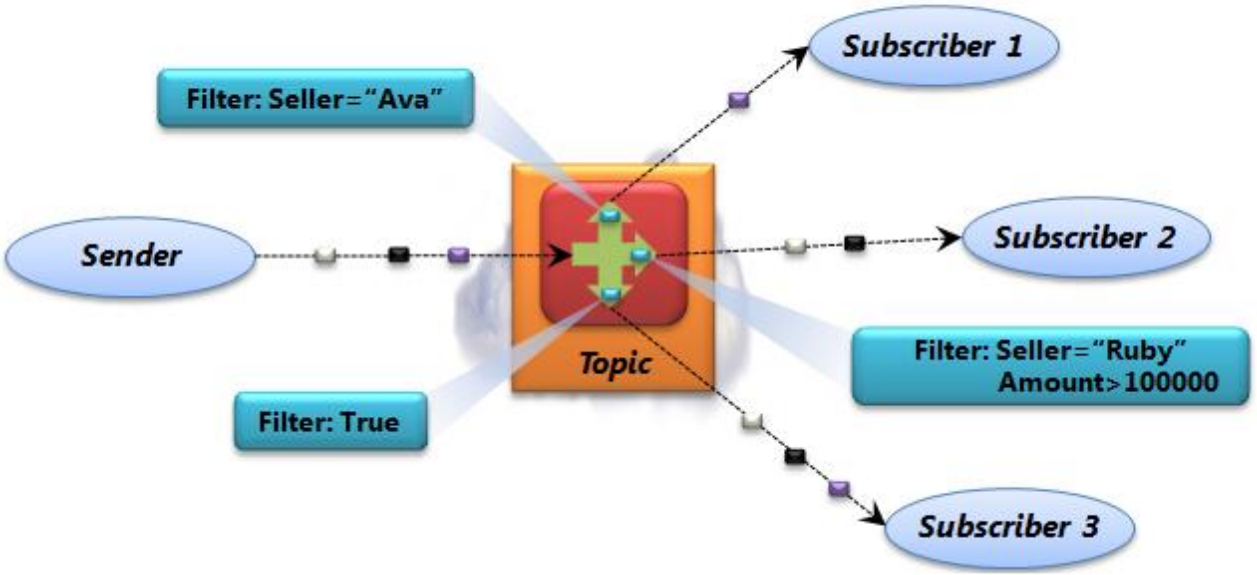
Service Bus Queues

- Allow one-direction communication.
- Each queue acts as an intermediary (sometimes called a broker) that stores sent messages until they are received
- FIFO order guarantee
- Each message is received by a single recipient



Service Bus Topics

- Similar to Pub/Sub
- One direction brokered communication
- Can filter messages that you want to receive



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Service Bus Relays

- Bi-directional communication
- Not brokered – no storage of in-flight messages
- Messages passed directly to application

Long-running **Applications**

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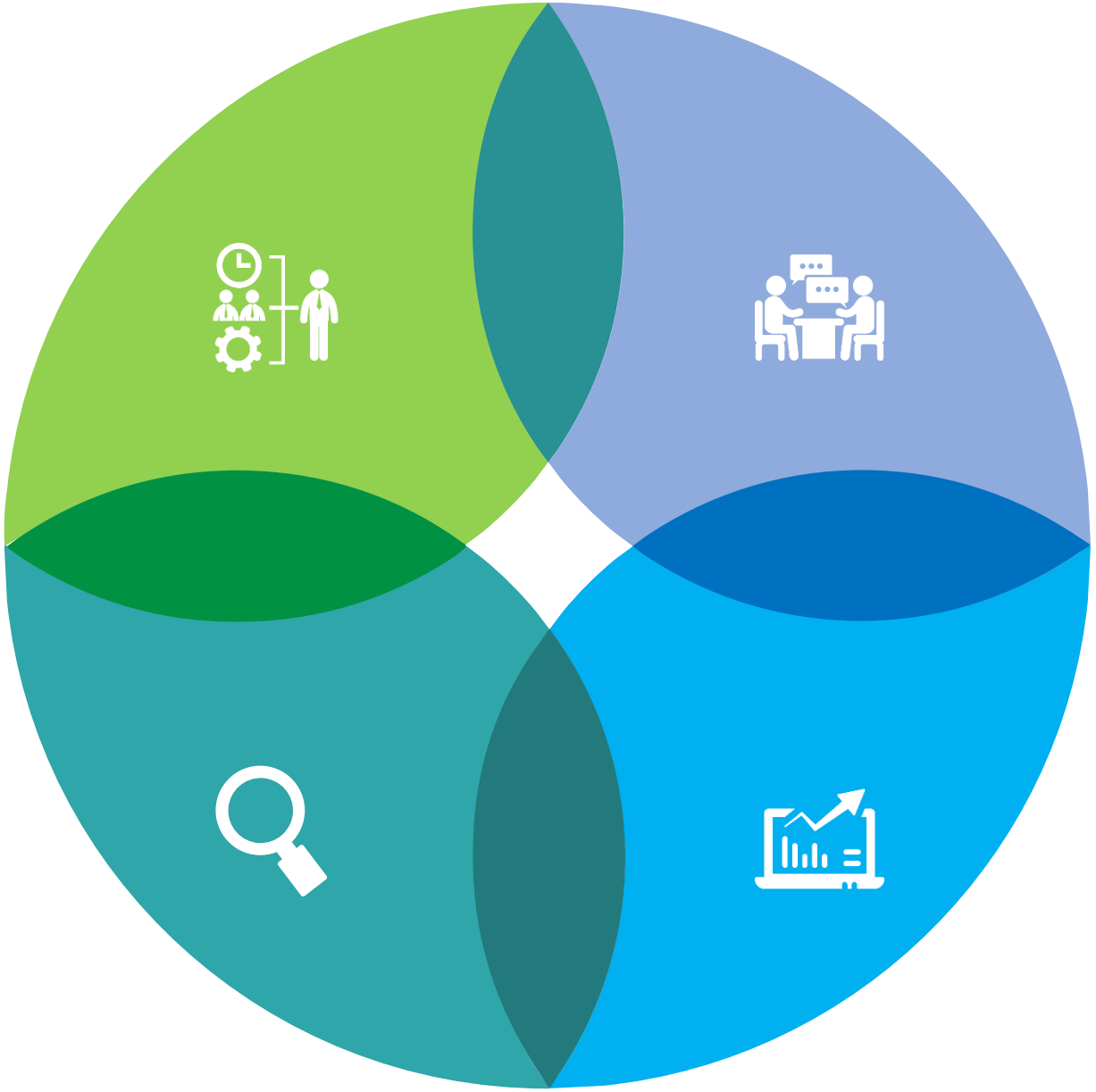
Long-running Applications Considerations



Availability

- Need to be aware of SLA's.
- Availability sets
- Avoid single points of failure
- Stateless vs Stateful processes

Reliability

- Fault and Update domains if using IaaS
- Error handling
- Retry logic

Scaling

- Up – beefier hardware
- Out – more instances of the hardware
- Design – "Cloud Native"

Monitoring

- Logs
- Current state
- Application health

Azure Scheduler

Scheduler creates, maintains, and invokes scheduled work. Scheduler does not host any workloads or run any code. It only ***invokes*** code hosted elsewhere—in Azure, on-premises, or with another provider. It invokes via HTTP, HTTPS, a storage queue, a service bus queue, or a service bus topic.

Azure Functions vs. Azure Web Jobs – Code First Integrations

Functions

Web Jobs

Scaling	Configurationless scaling	Scale with App Service plan
Triggers	Timer, Comsos DB, Event Hubs, Http/WebHook, Mobile Apps Notification Hubs, Azure Service Bus, Azure Storage	Azure Storage, Azure Service Bus
In-browser development	Supported	Not supported
Languages	C#, F#, PHP, Python, JavaScript	C#, Bash, PHP, Python, JavaScript

Integrating Azure Services

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Integrate Azure Services – Services Overview

Azure Active Directory

Synchronize on-premises directories and enable single sign-on

App Service

Quickly create powerful cloud apps for web and mobile

API Management

Publish APIs to developers, partners, and employees securely and at scale

Redis Cache

Power applications with high-throughput, low-latency data access

Azure Search

Fully-managed search-as-a-service

Service Bus

Connect across private and public cloud environments

Event Hubs

Receive telemetry from millions of devices

Stream Analytics

Real-time data stream processing from millions of IoT devices

IoT Hub

Connect, monitor, and control billions of IoT assets

Azure Active Directory provides identity management and access control for your cloud applications. To simply user access to cloud applications, you can synchronize on-premises identities, and enable single sign-on. Azure Active Directory comes in 3 editions: Free, Basic, and Premium.

Azure App Service lets you create apps faster with a one-of-a kind cloud service to quickly and easily create enterprise-ready web and mobile apps for any platform or device and deploy them on a scalable and reliable cloud infrastructure.

Azure API Management lets you publish APIs to developers, partners, and employees securely and at scale.

Azure Redis Cache—based on the popular open source Redis cache—gives you access to a secure, dedicated cache for your Azure applications.

Azure Search is a fully-managed service for adding sophisticated search capabilities to web and mobile applications without the typical complexities of full-text search.

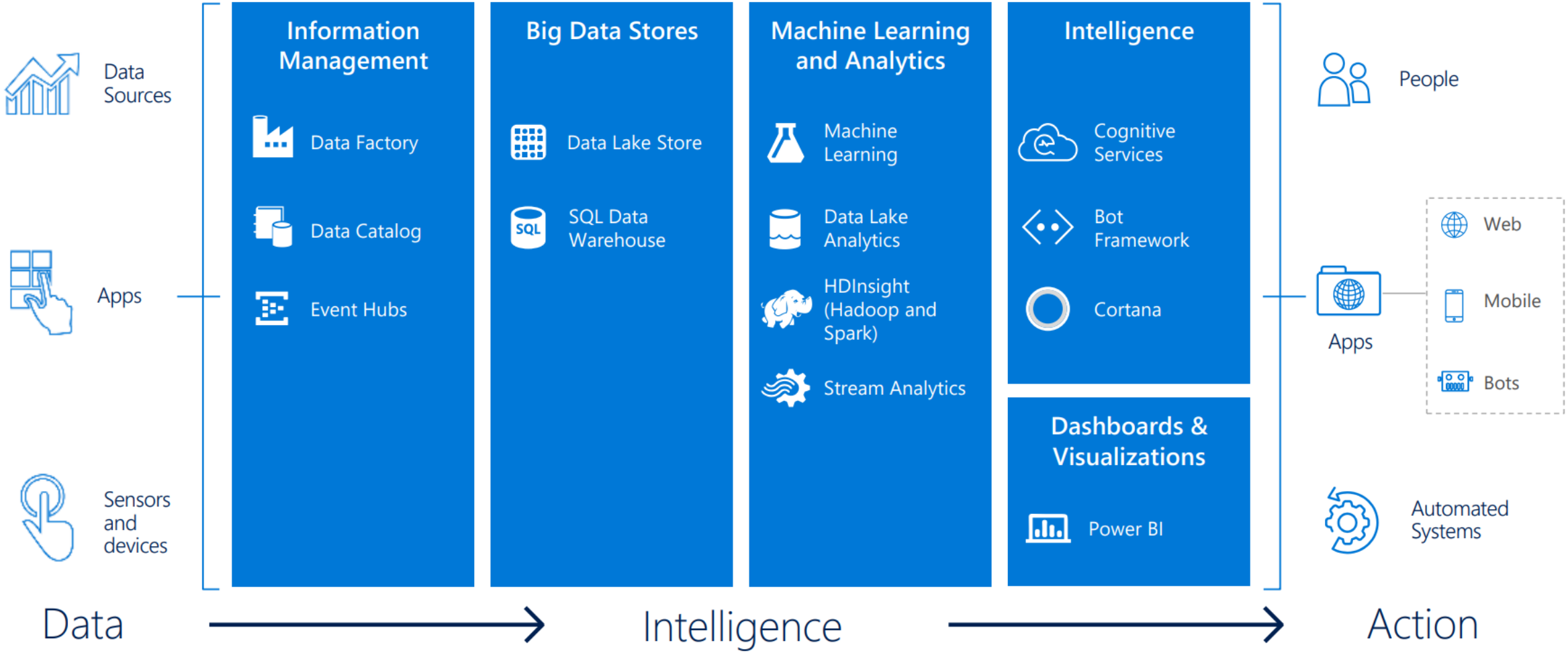
Azure Service Bus is a messaging infrastructure that sits between applications allowing them to exchange messages for improved scale and resiliency.

Azure Event Hubs enables elastic-scale telemetry and event ingestion with durable buffering and sub-second end-to-end latency for millions of devices and events.

Azure Stream Analytics is an event-processing engine that helps you gain insights from devices, sensors, cloud infrastructure, and existing data properties in real-time. It's integrated out of the box with Event Hubs, and the combined solution can both ingest millions of events and do analytics to help you better understand patterns, power a dashboard, detect anomalies, or kick off an action while data is being streamed in real time.

Jumpstart your Internet of Things project with Microsoft IoT Hub. Connect, monitor, and control billions of IoT assets running on a broad set of operating systems and protocols. Establish reliable, bi-directional communication with these assets, even if they're intermittently connected, and analyze—and act on—incoming telemetry data. Enhance the security of your IoT solutions by using per-device authentication to communicate with devices that have the appropriate credentials. Revoke access rights to specific devices to maintain the integrity of your system.

Standard Azure Big Data Analytics Process



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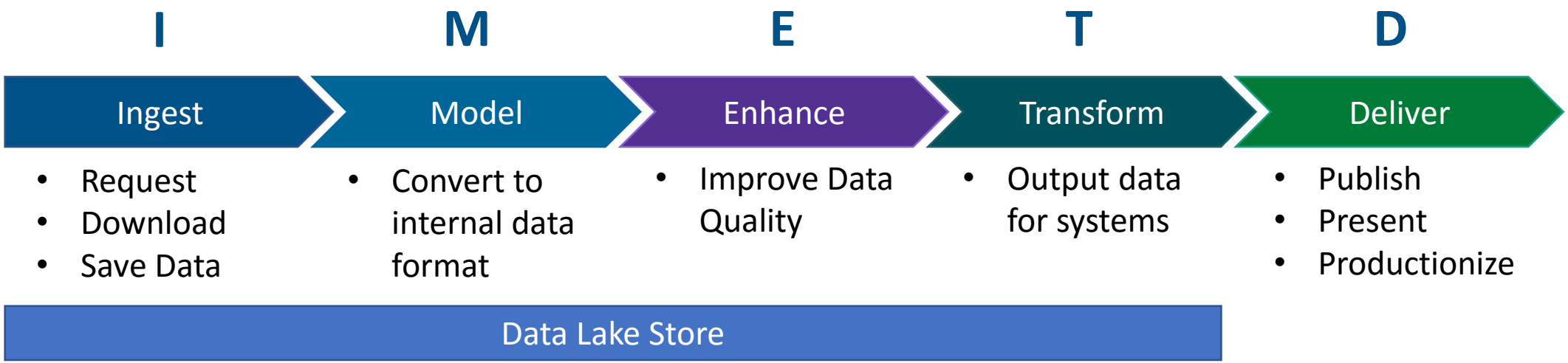
Pariveda's IMET-D Framework



Examples

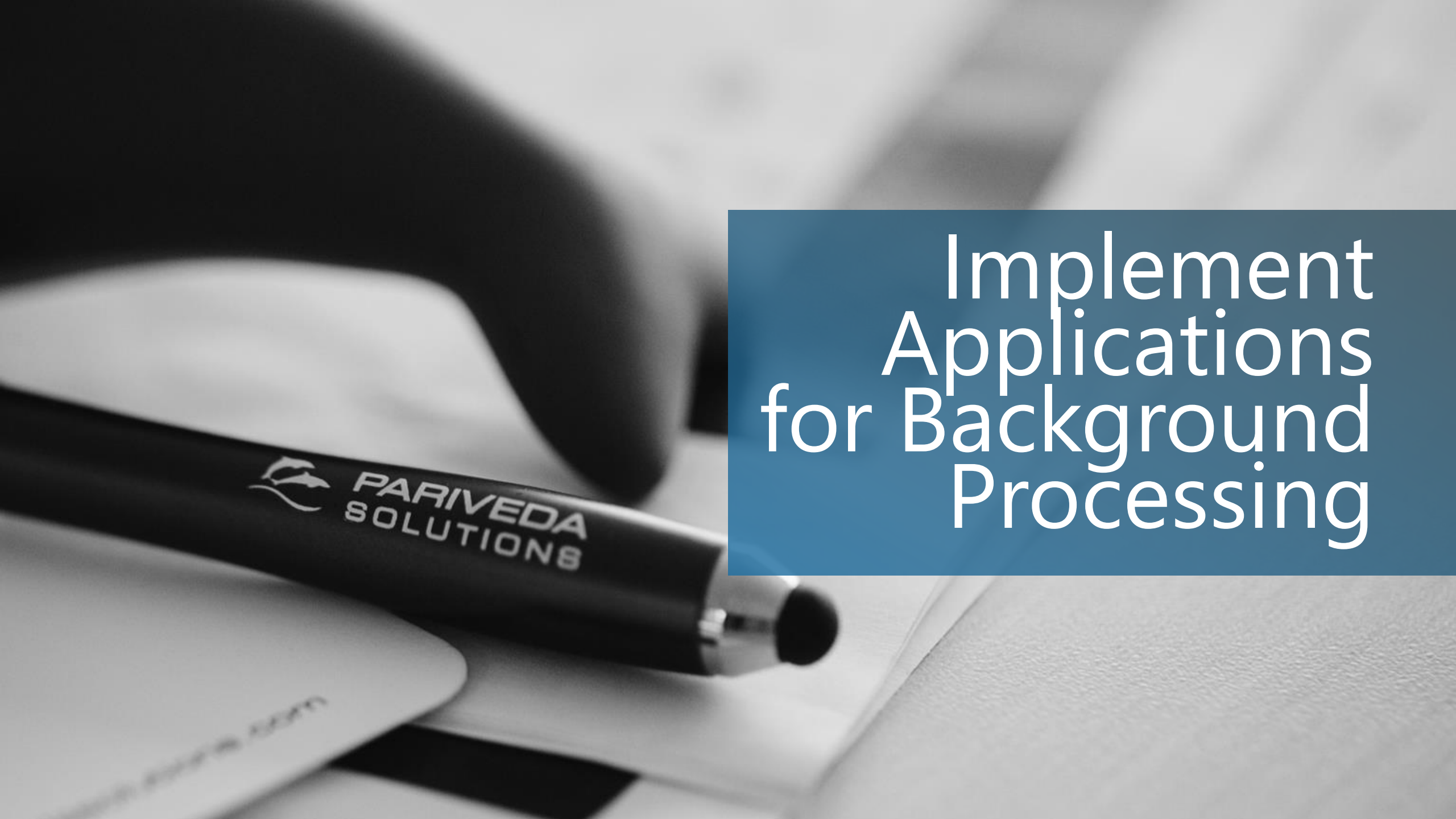
- Download from FTP
- Request from API
- Save to Data Lake

- Organize & categorize data
- Convert like-data from various sources to standard format

- Apply business logic
- Convert to UTC time
- Fill in gaps
- Assign data grade

- Create output JSON, CSV, etc.
- Save to application database
- "Structure" the data

- Power BI
- Mobile App
- Publish via API
- Machine Learning
- Feedback loop



Implement Applications for Background Processing

Applications for Background Processing– Services Overview

Batch

Cloud-scale job scheduling and compute management

Azure Batch makes it easy to run large-scale parallel and high-performance computing (HPC) workloads in Azure. Use Batch to scale out parallel workloads, manage the execution of tasks in a queue, and cloud-enable applications to offload compute jobs to the cloud.

App Service

Quickly create powerful cloud apps for web and mobile

Azure App Service lets you create apps faster with a one-of-a kind cloud service to quickly and easily create enterprise-ready web and mobile apps for any platform or device and deploy them on a scalable and reliable cloud infrastructure.

Functions

Process events with serverless code

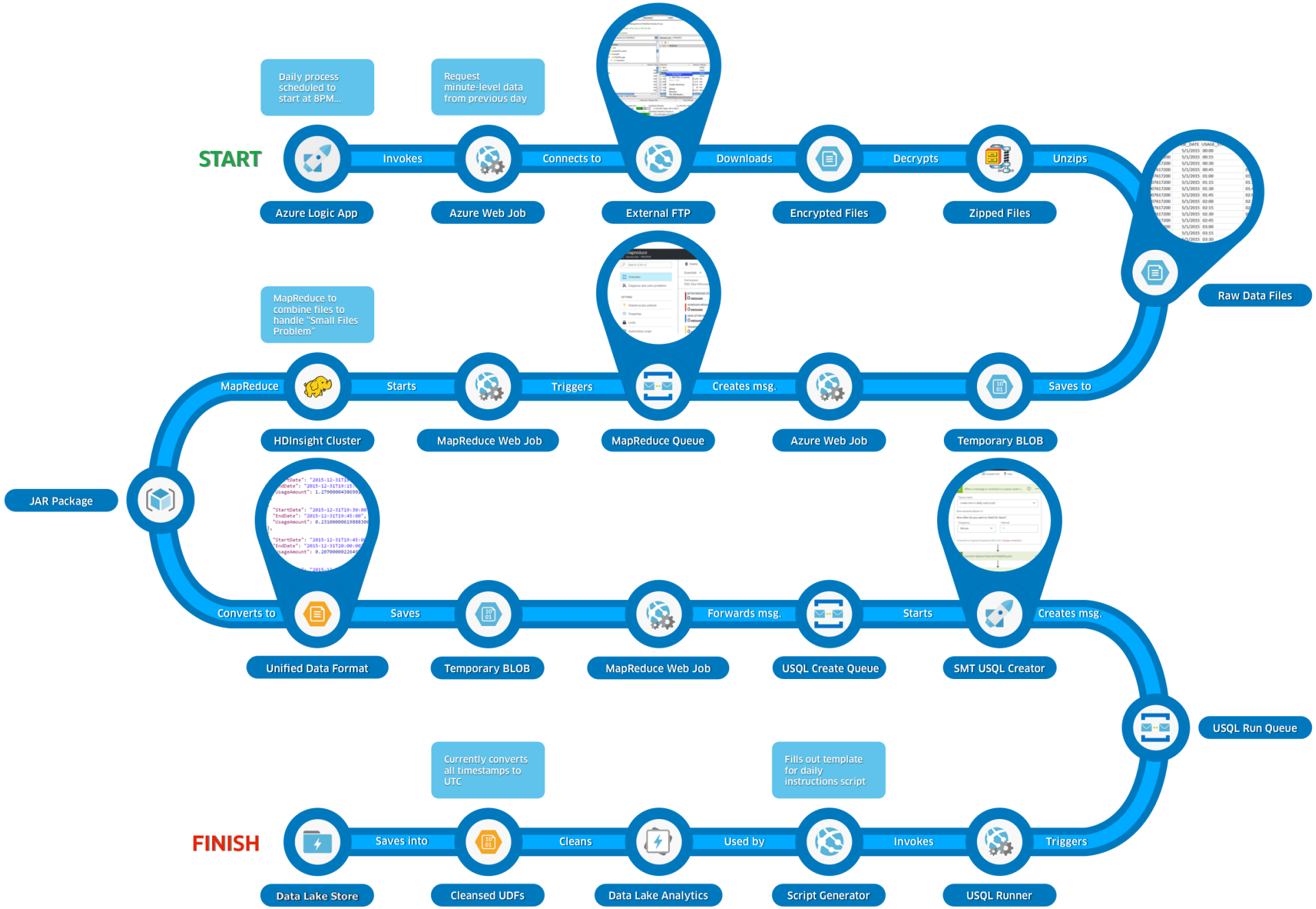
Azure Functions is an event driven, compute-on-demand experience. You can leverage Azure Functions to build HTTP endpoints accessible by mobile and IoT devices.

Scheduler

Run your jobs on simple or complex recurring schedules

Azure Scheduler lets you invoke actions that call HTTP/S endpoints or post messages to a storage queue on any schedule. Create jobs that reliably call services either inside or outside of Azure and run those jobs right away, on a regular or irregular schedule, or at a future date.

Example



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Questions?

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