



# From RTOS to Serverless: the journey of a telemetry!

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**#ScottishSummit2023**

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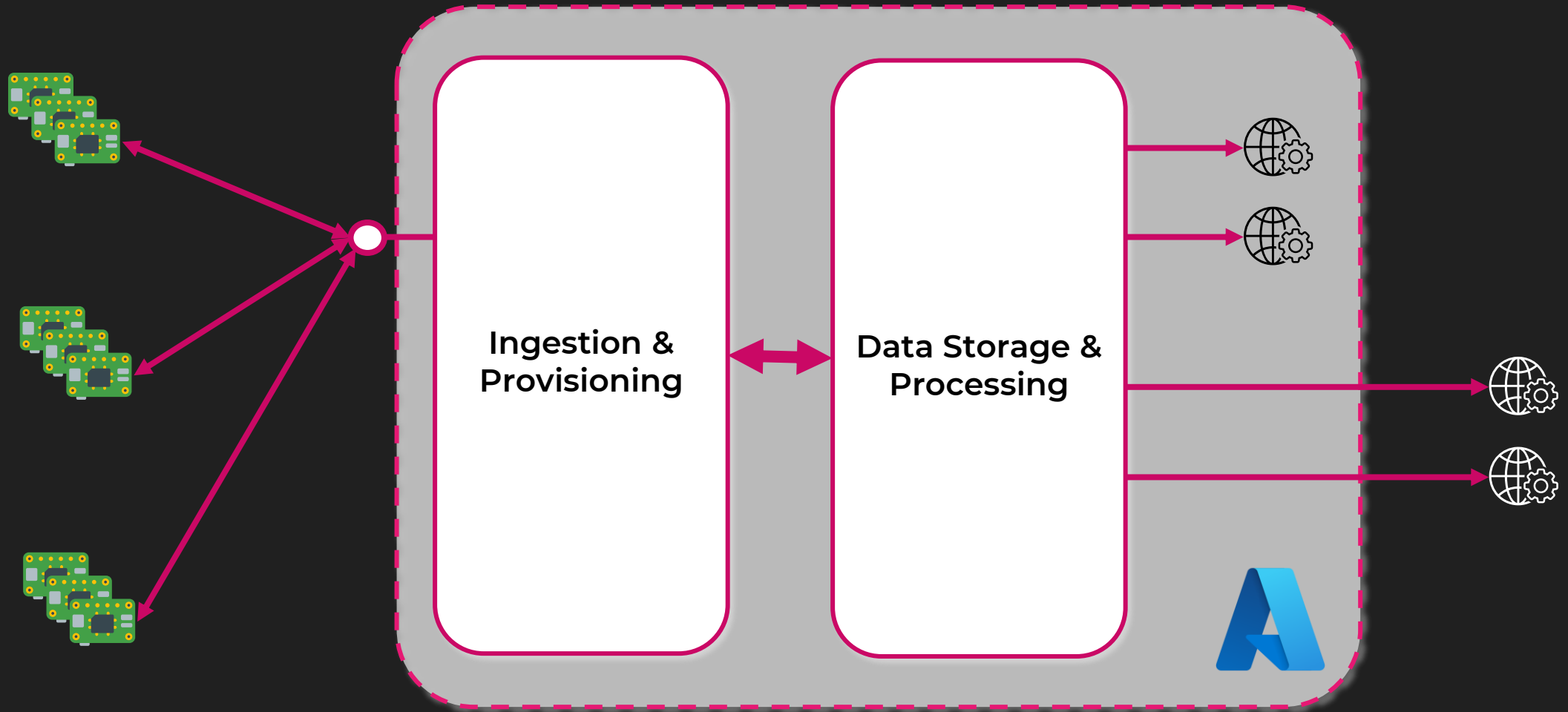
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# IoT Architecture





# The Edge side

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# What's EDGE?

- Tiny Edge
- Light Edge
- Heavy Edge



Tiny Edge



Light Edge



Heavy Edge



- MCU-class Sensors/Actuators
  - Azure Spere and RTOS

- PC Class
  - Windows IoT (also, Pro & Enterprise)

- Hybrid server, Hyper converged infra
  - Azure Stack

# Market and applications

More suitable

Less suitable

## Azure RTOS



Smart phones



Fitness trackers



Sensors



Consumer Electronics



Thermostats, Smoke Alarms



Medical diagnostics



POS, Kiosks ATMs, Gas Pumps, Vending, Digital signage



PLC/Indus. Automation Embedded Servers

## Azure Sphere



Connector Boards Guardian modules



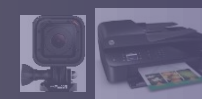
Medical diagnostics



Home appliances



IOT Gateways



Consumer Electronics



Smart phones



Fitness trackers

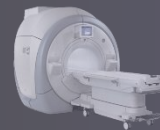
## Windows IoT



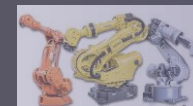
POS, Kiosks ATMs, Gas Pumps, Vending, Digital signage



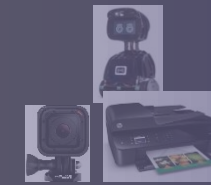
HMI, PLC/Indus. Automation Embedded Servers



MRI, Xray devices



Industrial Robots & gateways



Consumer Electronics



Smart phones



Fitness trackers



Sensors



# The Serverless side

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# Why Durable Functions?



## Stateful Operations

Durable Functions maintain their state between calls. This is in contrast to typical serverless functions, which are stateless.



## Long-Running Tasks

With Durable Functions, you can write long-running workflows without worrying about the duration of a single function call.



## Built-in Concurrency and Rate Control

Durable Functions allow you to manage and control concurrent function execution.



## Cost-Effective

Like other Azure Functions, Durable Functions only charge for the time your code is running. This makes them very cost-effective as you are not billed for idle time in between executions.



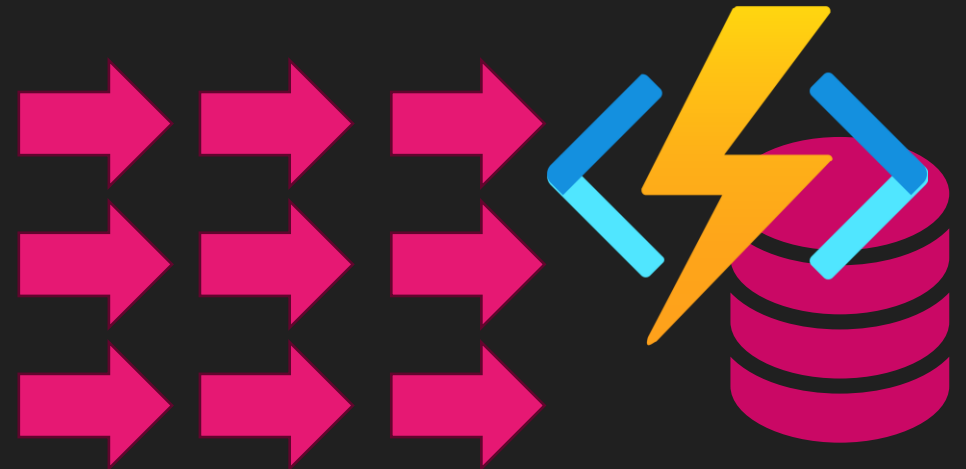
## Error Handling Retry Policies

Durable Functions provide built-in capabilities for error handling and automatic retries. This is very important for building robust, reliable applications.

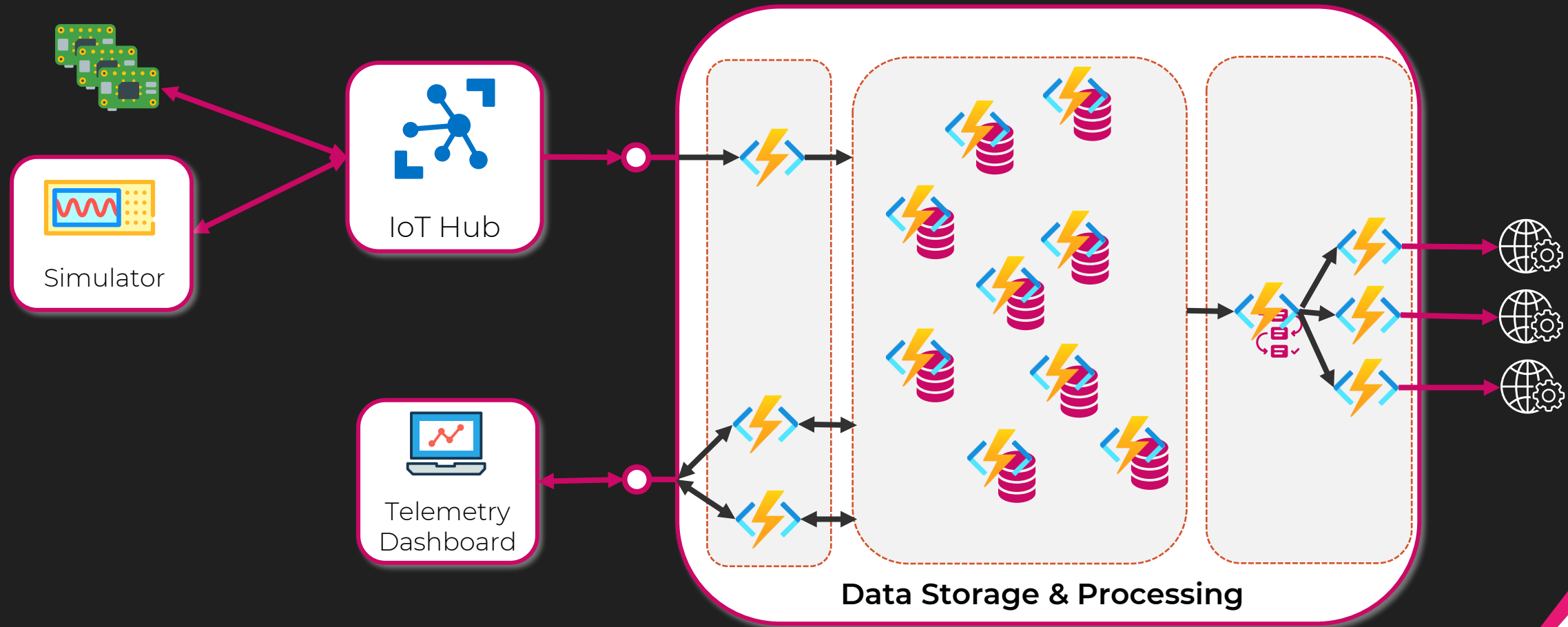


# Why Durable Entities?

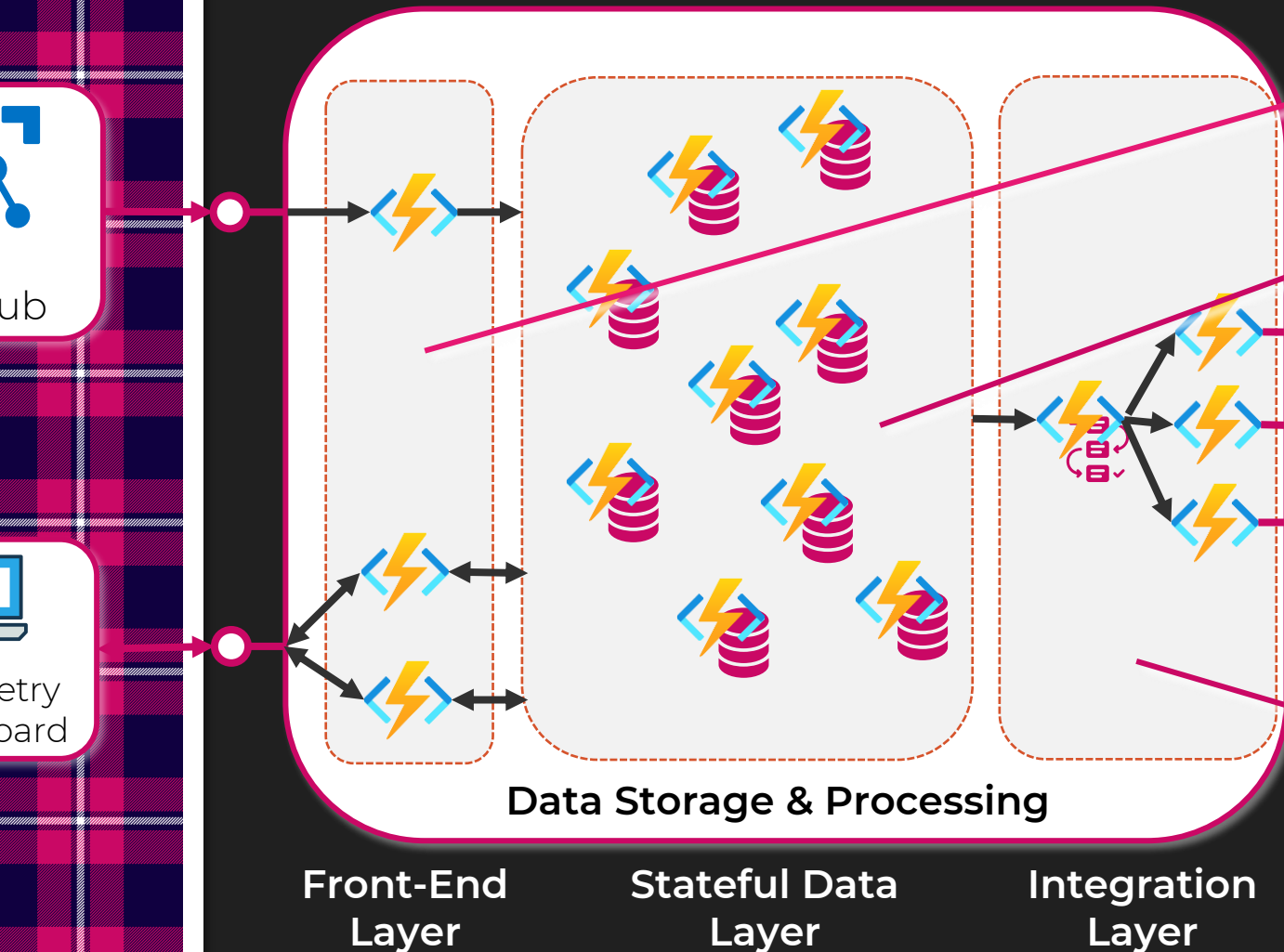
- Durable Entities allow you to implement Aggregator Pattern
- The Aggregator pattern provides a way to aggregate event data over time in a single entity.
- Durable Entities manage the concurrency: for each entity, its state is modified by only one data at a time (similar to Actor Model).



# The Serverless solution



# The Serverless solution



## Front-End Layer:

**Azure Functions** listen the IoT Hub events and expose REST APIs to search devices and retrieve status for each device

## Stateful Data Layer:

**Durable Entities** provide stateful layer to manage status of each device

## Integration Layer:

**Durable Functions** provide integration with external services and allow you to create complex workflow to integrate more than one external service

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# Thank you for your attention !!



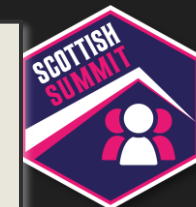
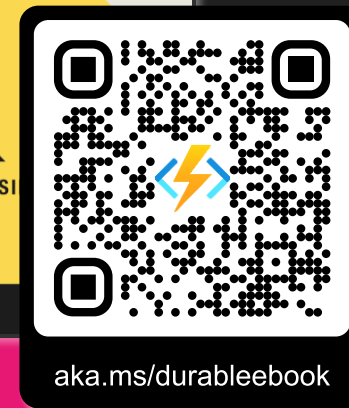
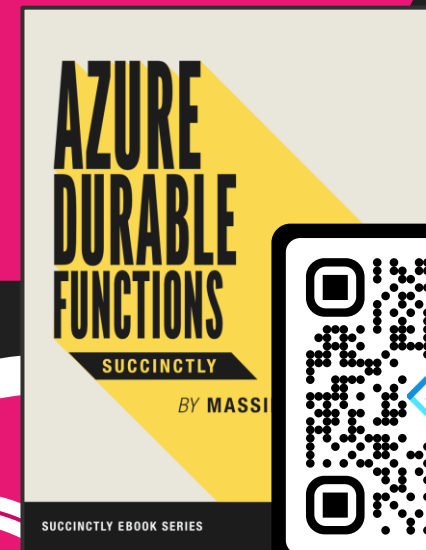
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# References

- [Durable Functions overview](#)
- [Developer's guide to durable entities in .NET](#)
- [Entity Functions](#)
- [Durable Functions Extension \(GitHub repo\)](#)
- [GitHub ServerlessIoT Demo](#)
- [Azure Durable Functions Succinctly \(ebook\)](#)
- [Azure MXChip IoT DevKit Get Started](#)
- [MXChip Azure IoT DevKit Repository](#)