

Cloud-Native Event-Driven Java Architecture with Spring On Azure

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Event Driven Examples are Everywhere

Ordering
coffee



Processing
loans



Handling
customer
complaints



Receiving
email



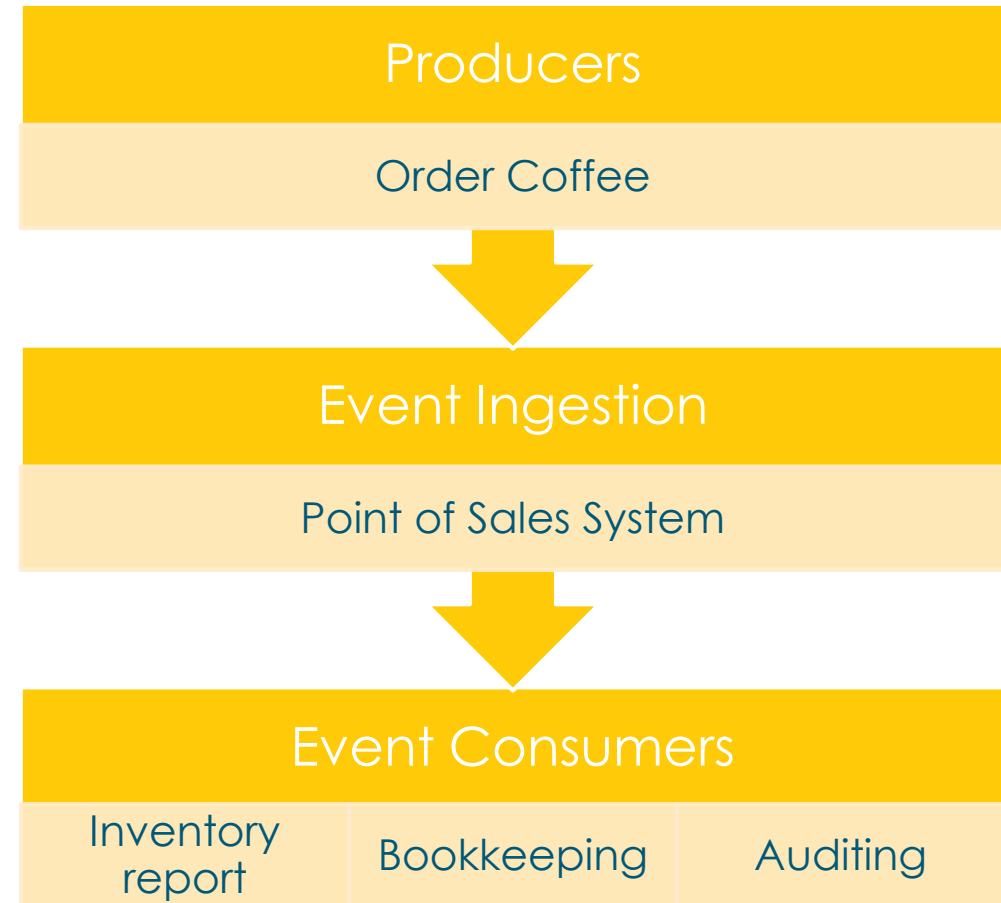
Event-Driven Architecture Style

Event Producers

- Pub/Sub
- Event Streaming

Event Consumers

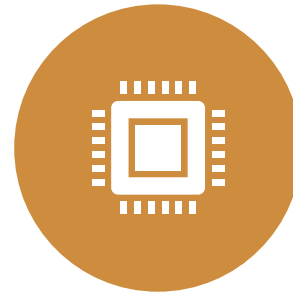
- Simple event processing
- Complex event processing
- Event stream processing



When to use Event-Driven?



Multiple subsystems processing the same events



Real-time processing and with low latency



Complex event processing (pattern matching, aggregation over a time period)



High volume and high velocity of data



What do you
want for an
event-driven
architecture?

Architectural Characteristics and Benefits

- Decoupled
- Single-purpose components
- Trigger-friendly systems
- Scalable infrastructure
- Stateless and streaming handlers
- Flexible storage options
- Simple extensibility
- Observability and traceability
- Subsystems have independent views of event streams



How Azure can help?

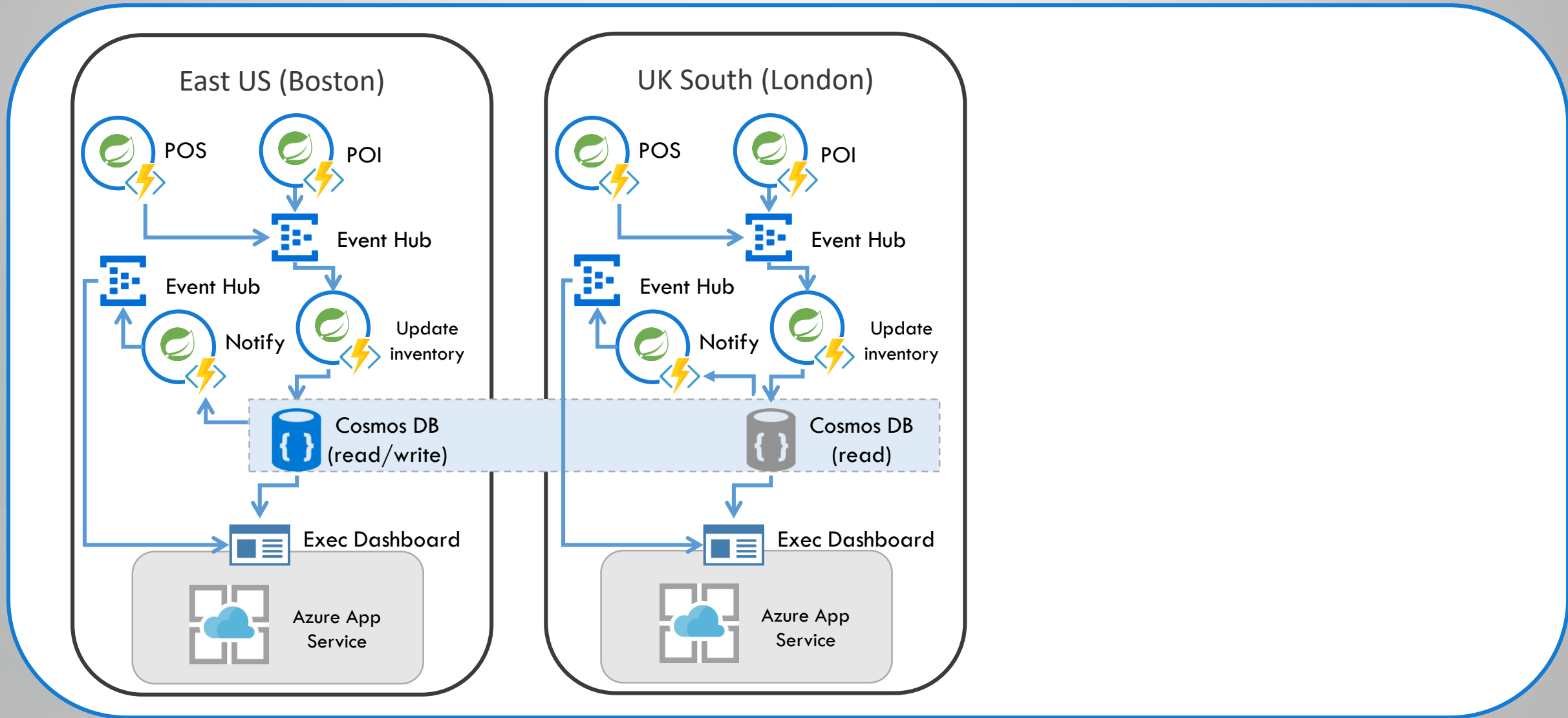
- Distinct (managed) services to ingest, process, and store data
- Global, instant scale
- Robust functions platform
- High throughput, reliable event processing
- Virtually limitless data storage
- Comprehensive security and monitoring services



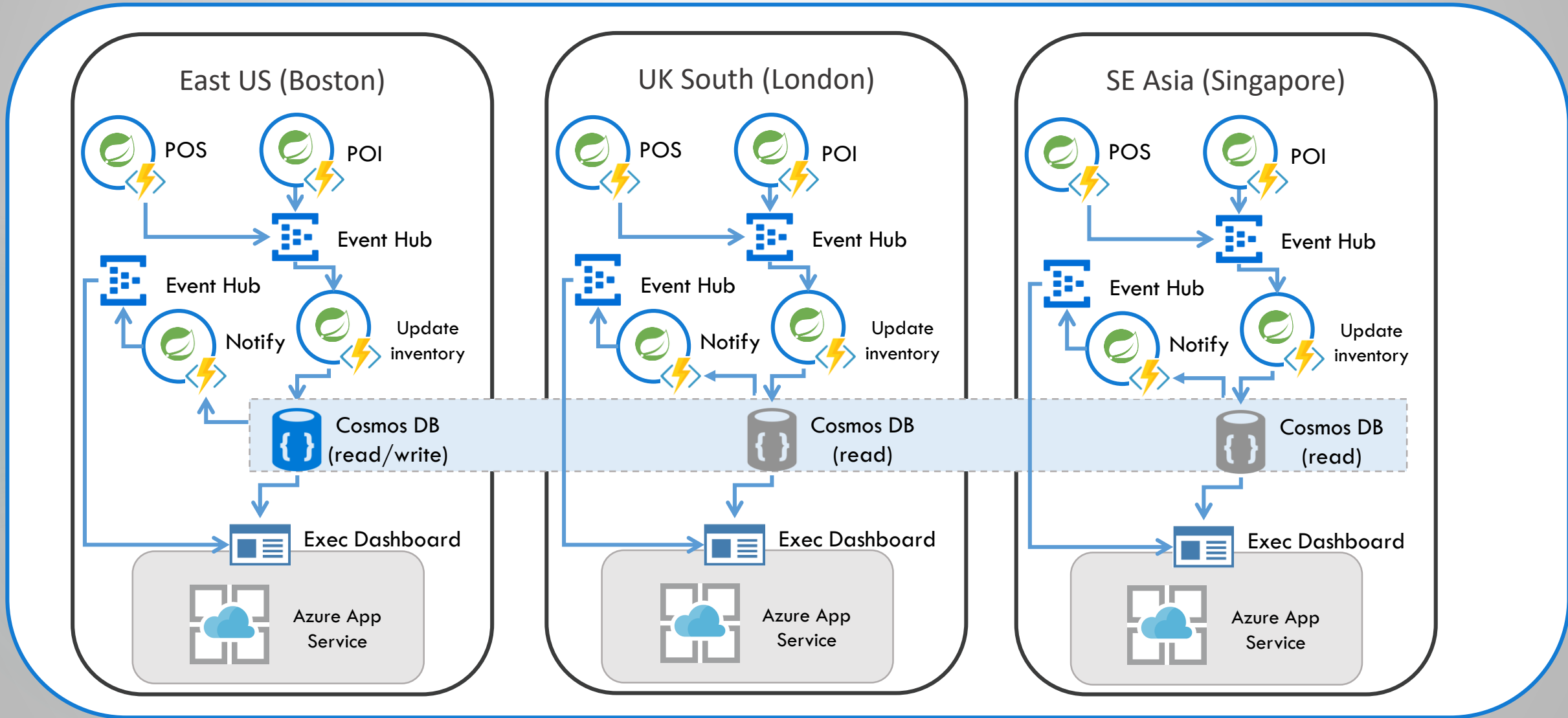
How Spring on Azure can help?

- Spring has libraries for Reactive, stream-oriented applications
- Spring Cloud Stream Binder for Event Hub and Kafka
- Function paradigm for event-driven workloads
- Spring Data support for SQL Database, MySQL, PostgreSQL, Cosmos DB, MongoDB and Gremlin
- Spring Security using Azure Active Directory (AAD) and AAD B2C
- ...

Stargazer Cafe - event-driven architecture



Stargazer Cafe - event-driven architecture





DEMO TIME!

<https://aka.ms/ihub>

<https://aka.ms/ihub-events>

Components of an Event-Driven Architecture

Spring Cloud Functions



Spring Cloud[®]

What is Spring Cloud Functions?

- Spring project to help you implement business logic as functions

Why is Spring Cloud Functions important for Event-Driven apps?

- Brings power of Spring Boot (auto-config, dependency injection) to serverless platforms
- Can create executable beans from input strings (dynamic compilation)
- Run the same code exposed as web endpoint or stream processor
- Keeps a registry of functions, consumers, and suppliers
- Works with public cloud Function-as-a-Service runtimes (like Microsoft Azure!)

Spring on Azure

<http://cloud.spring.io/spring-cloud-azure/>



Spring Data <ul style="list-style-type: none">• SQL Database• MySQL• PostgreSQL• Maria DB• Cosmos DB<ul style="list-style-type: none">• SQL• MongoDB• Cassandra• Gremlin	R2DBC <ul style="list-style-type: none">• SQL Database• PostgreSQL	Spring Resource <ul style="list-style-type: none">• Storage	Spring Cache <ul style="list-style-type: none">• Redis Cache	Spring Messaging <ul style="list-style-type: none">• Service Bus
	Spring Boot <ul style="list-style-type: none">• Virtual Machines• Containers in Azure Kubernetes Service (AKS)• App Service on Linux• PCF on Azure	Spring Cloud <ul style="list-style-type: none">• App Configuration• Event Hubs• Service Bus• Storage• Redis• Functions	Spring Security <ul style="list-style-type: none">• Active Directory (ADD)• ADD - B2C• Microsoft 365• Microsoft Account	Micrometer <ul style="list-style-type: none">• Monitor (includes Log Analytics)



Azure Cosmos DB

<https://azure.microsoft.com/en-us/services/cosmos-db/>



What is Cosmos DB?

- Globally distributed multi-model, multi-master data storage service

Why is Cosmos DB important for Event-Driven apps?

- Multi-region replication, requests are served from local regions
- Multiple, well-defined consistency choices
- Elastically scalable storage and throughput
- Multi-model and multi-API – key-value, document and graph + SQL, Cassandra, MongoDB, Table and Gremlin
- Schema-agnostic, automatic indexing
- Always encrypted at rest and in motion

Azure Event Hubs

<https://azure.microsoft.com/en-us/services/event-hubs/>

What is Event Hubs?

- Fully managed cloud scale ingestion of data that can handle volume, variety and velocity

Why is Event Hubs important for Event-Driven apps?

- Suitable for hyperscale telemetry ingestion, processing real-time
- Supports multiple languages including Java
- Option to use a Kafka endpoint interface for publishers and subscribers
- Integrates with other Azure services



Azure Functions

<https://azure.microsoft.com/en-us/services/functions/>



What is Azure Functions?

- Serverless “managed” compute service to run code on-demand without provisioning or managing any infrastructure

Why is Azure Functions important for Event-Driven apps?

- Run in response to any event
- Functions can be triggered by any events including Storage, Cosmos DB, Event Hubs, Service Bus, Event Grid, HTTP etc.
- Native input and output binding integrations with many cloud services
- Support multiple programming languages including Java, C#, F#, and Node
- Use tools and technologies that Java devs know and love to deploy – Maven, VS Code, IntelliJ, Eclipse, Jenkins etc.

Azure App Service on Linux

<https://azure.microsoft.com/en-us/services/app-service/>

What App Service?

- Fully managed app service platform

Why is App Service important for Event-Driven apps?

- Supports multiple languages
- Java JAR and WAR packages
- Managed **Java SE, Tomcat and WildFly/JBoss** environments
- Use tools and technologies that Java devs know and love to deploy - **Maven, VS Code, IntelliJ, Eclipse, Jenkins**, etc.
- Built-in **auto scale and load-balancing** with **auto-patching** of the underlying stack
- **Secure apps** using Azure Active Directory
- Use APMs of your choice - **New Relic, App Dynamics or Dynatrace**



Azure Monitor

<https://azure.microsoft.com/en-us/services/monitor/>



What is Azure Monitor?

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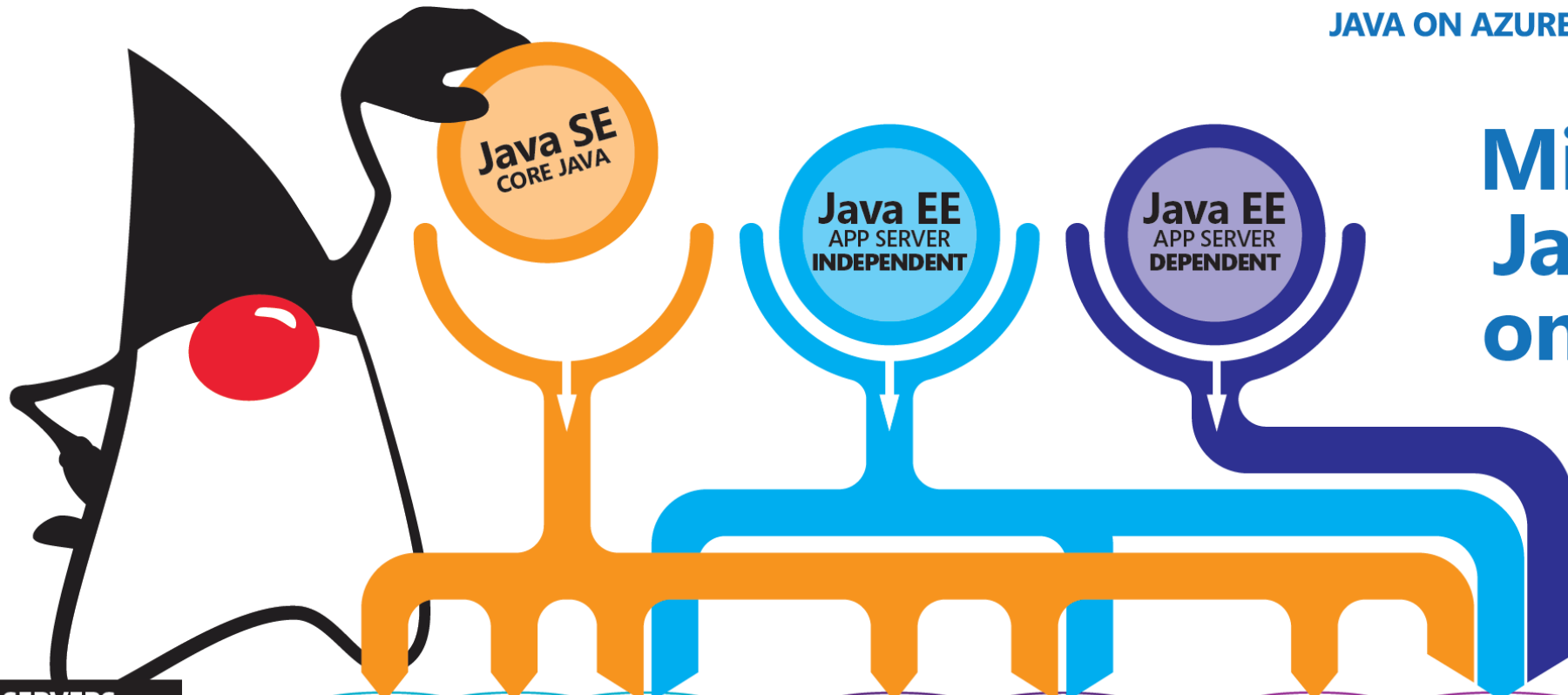
Why is Azure Monitor important for Event-Driven apps?

- Azure Log Analytics and Azure Application Insights are **integrated** features within Azure Monitor
- Provides DevOps and SRE teams the **observability** they need for complex modern applications
- **One Metrics** - Metrics are collected automatically from most of the Azure services you use, and you can send custom metrics
- **One Logs** - Azure Monitor is now the central platform for collecting logs from across monitoring, management, security and all other log types
- **One Alerts** - The new alert management experience is now available for all resources in Azure
- Full stack, **end-to-end visibility** via Resource Groups
- Use **hot stream or cold path** for aggregating logs, metrics and alerts in ELK or Splunk



Build New or Migrate?

Migrating Java apps on Azure?



APPLICATION SERVERS

INDEPENDENT Java EE applications deployable to any certified/compatible application server.

DEPENDENT Java EE applications with application server implementation dependencies.



PaaS
PLATFORM-AS-A-SERVICE

DIY PaaS
DO-IT-YOURSELF
PLATFORM-AS-A-SERVICE

IaaS
INFRASTRUCTURE-AS-A-SERVICE

Microsoft Azure

What type of Java apps are you running?



Java SE
Core Java

- Spring Framework
- Spring Cloud
- Spring Boot
- Tomcat



Java EE
App Server
Independent

Java EE applications deployable to any certified or compatible application server.



Java EE
App Server
Dependent

Java EE applications with application server implementation specific dependencies.

Partnerships and Collaborations

Pivotal

- Pivotal Cloud Foundry (PCF)
- Spring Framework
- Spring Cloud
- Spring Boot

Red Hat

- Red Hat OpenShift Cloud Platform
- Red Hat JBoss EAP
- Red Hat Enterprise Linux (RHEL)
- Red Hat Ansible
- Red Hat Terraform
- Red Hat Windows SQL support

Azul Systems

- Azul Zulu Enterprise
- More to come...

Your Azure Options

PaaS (Platform-as-a-service)

- Azure App Service

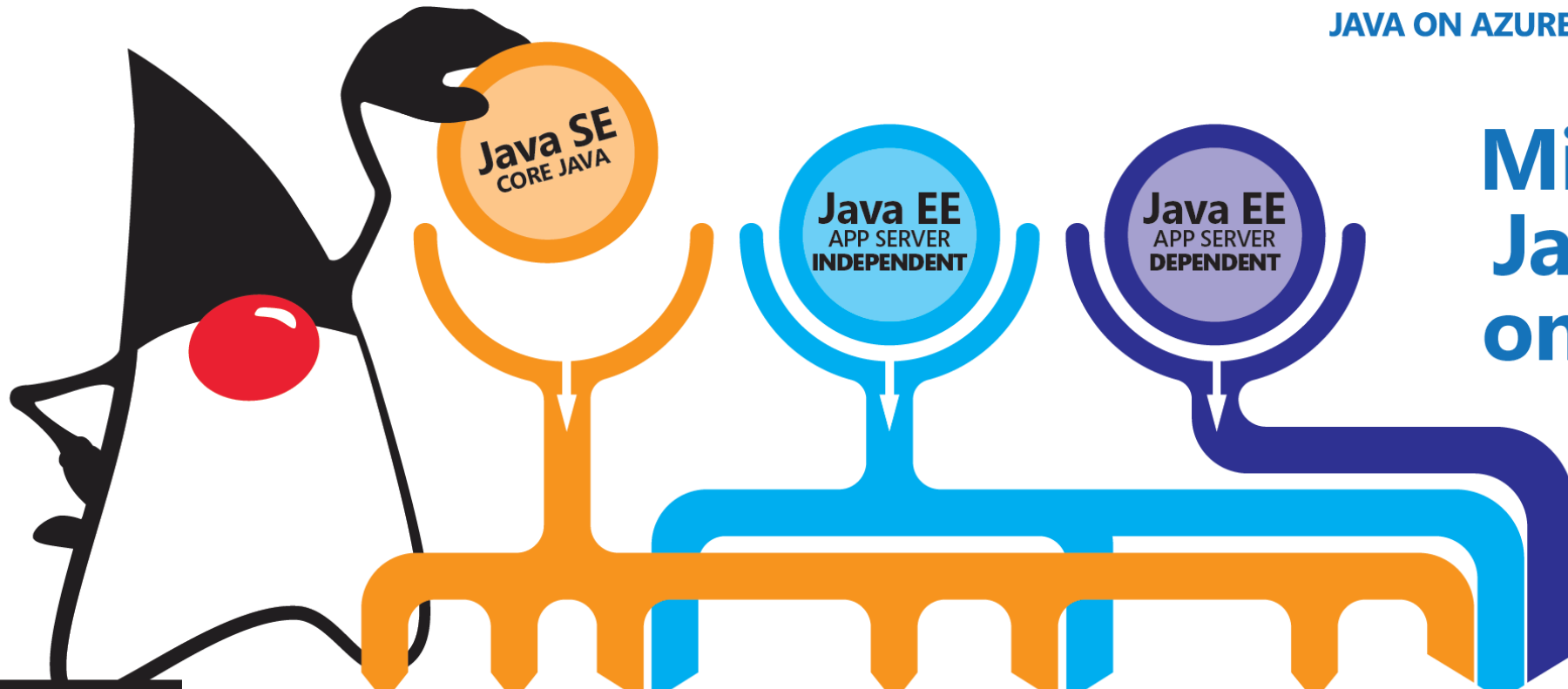
DIY PaaS (Do-It-Yourself PaaS)

- Red Hat OpenShift Cloud Platform
- Pivotal Cloud Foundry

IaaS (Infrastructure-as-a-service)

- Azure Kubernetes Service (container service)
- Virtual machines

Migrating Java apps on Azure?



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APP SERVICE ON LINUX

DIY PaaS

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Microsoft Azure



Free Java LTS on Azure

- Free support for all Java LTS versions
- Available for all environments, cloud and on-premise development machines
- Supported OS: Win, Linux, MacOS
- Supported Platform: Microsoft Azure, Azure Stack
- Technical preview for non-LTS versions
- Upstream changes pushed to OpenJDK by Azul Systems

Available now, supported until...



Available now



OpenJDK™

LTS

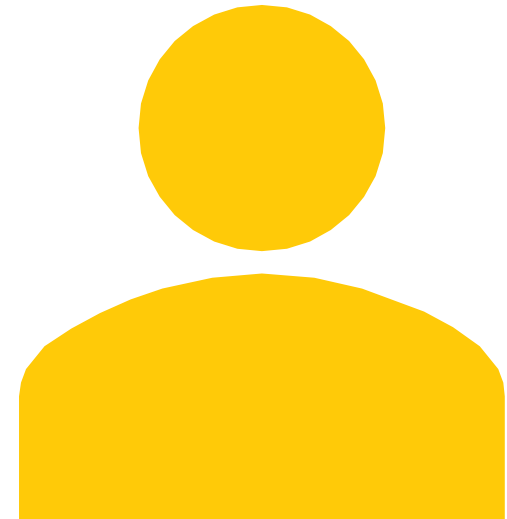
Non-LTS

Survey

[HTTPS://AKA.MS/JAVAMUG_2019](https://aka.ms/javamug_2019)

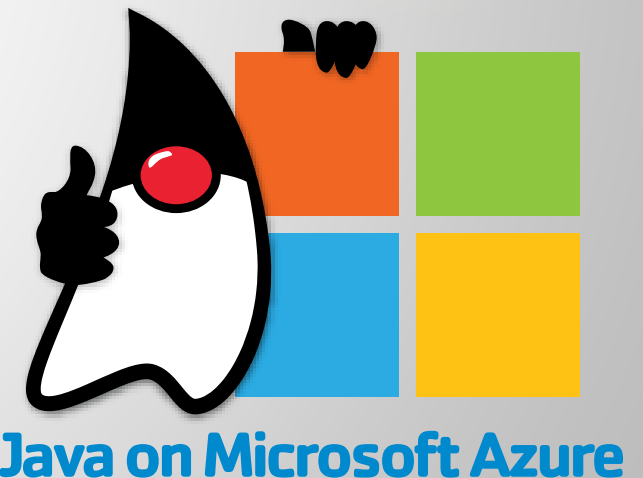
<https://aka.ms/JavaOnAzure-JOBS>

- Principal Architect
- Sr. Program Manager – Platform Services
- Sr. Software Engineer – Tooling
- And more coming...



What's next?

- Download and try out - [Inventory Hub project](#)
- Spring on Azure - <http://cloud.spring.io/spring-cloud-azure/>
- Dev goodies - [Azure for Java developers](#)
- Free trial – Azure.com/Free



Stay in touch



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