Microsoft Azure

Modernise Your Java Apps

Four stories of cloud-powered innovation towards performance, security and customer experience

Introduction

From digital native giants such as Twitter, Netflix and Uber, to enterprises with legacy portfolios, Java is powering our digital world[1][2]. With the recent dramatic consumer shift toward online channels, companies have accelerated the adoption of digital technologies by several years. To stay competitive in this environment and be better prepared for future disruptions, organisations are modernising their business-critical applications and accelerating their investment in technologies and cloud adoption.

Research conducted by Coding Dojo on the most in-demand programming technologies among the world's top start-ups shows Java in the top three languages, which comes as no surprise as Java continues to hold significant developer mindshare and is also one of the three most popular programming languages reported by RedMonk and PyPL. Many organisations have substantial investments in mission-critical Java applications running on-premises and need fully supported environments to run these apps in the cloud.

Over the past several years, the Java ecosystem landscape has evolved, from monolith Java EE applications running on application servers and the Spring Framework to modern smaller- footprint Spring Boot, MicroProfile and Jakarta EE microservices. The following customer stories show how modernising different Java applications with cloud-managed services empowers organisations to innovate, improves cost efficiency and increases scalability, all while meeting strict security and regulatory requirements. These stories highlight how the cloud gives developers and IT professionals more flexibility to focus on business priorities and innovation rather than infrastructure management. Ultimately, this leads to improved productivity and overall customer satisfaction.

1 https://stackshare.io/java
2 https://www.jrebel.com/blog/2021-java-technology-report

1.

Improve performance and the customer experience

AIA Singapore Private Limited is a subsidiary of AIA Group Limited, a leader in life insurance and financial services, with branches and subsidiaries across 18 Asia-Pacific markets. Since 1931, AIA Singapore has been serving generations of Singaporeans, supporting them throughout their lives. The company is recognised for its leadership in business technology. When the company launched the interactive point of sale (iPoS) application a few years ago, it was one of the first insurance companies to release a high-profile business application available on mobile tablets.

With more customers preferring online services, the company wanted to provide a seamless web experience and more innovative digital tools to customers. But with unpredictable spikes in traffic and underutilised on-premises servers, the company required cloud efficiencies and a more modern platform.

Journey to the cloud

AIA Singapore chose Azure for its ambitious plan to transform and further enhance all its platforms. Azure checked all the boxes with its resilience, autoscaling features, on-demand provisioning, open- source options and built-in high availability and disaster recovery.

The iPoS app is just one of many vital, Java-based workloads that the company moved to Azure. AIA Singapore modernised more than 80 business-critical Java 6 apps running on different versions of JBoss Enterprise Application Platform (EAP) app servers by porting them to Apache Tomcat, an open-source implementation of the web server environment in which Java code can run. This enabled AIA Singapore to take advantage of containers and Azure Kubernetes Service (AKS), the popular container orchestrator that offers a convenient way to host applications at scale.

Some applications required integration with multiple large-scale on-premises systems, and a hybrid configuration gave AIA Singapore the flexibility to move at a quicker pace that worked for the business. "We modernised our web application to be capable of running in AKS," explains Deepa Manogaran of the AIA Singapore iPoS team. "AKS is quite easy to adapt. Now our application can start in a few seconds and serve the requests faster than on-premises." In addition, the on-premises Sybase database was migrated to Azure SQL Managed Instance as part of the application refactoring process, providing AIA Singapore all the benefits of a fully managed database as a service.

The new Azure architecture implemented by the company reflects the Zero Trust model, which locks down access to resources from both inside and outside of the network. To ensure compliance, governance and best practices, AIA Singapore utilised Azure landing zones, a set of architecture guidelines, reference implementations and proven code samples for preparing cloud environments. For business continuity, AIA Singapore mirrors its primary Azure data centre, located in Singapore, in a secondary region in Hong Kong. This set-up provides resilience and disaster recovery, thereby giving the company peace of mind.

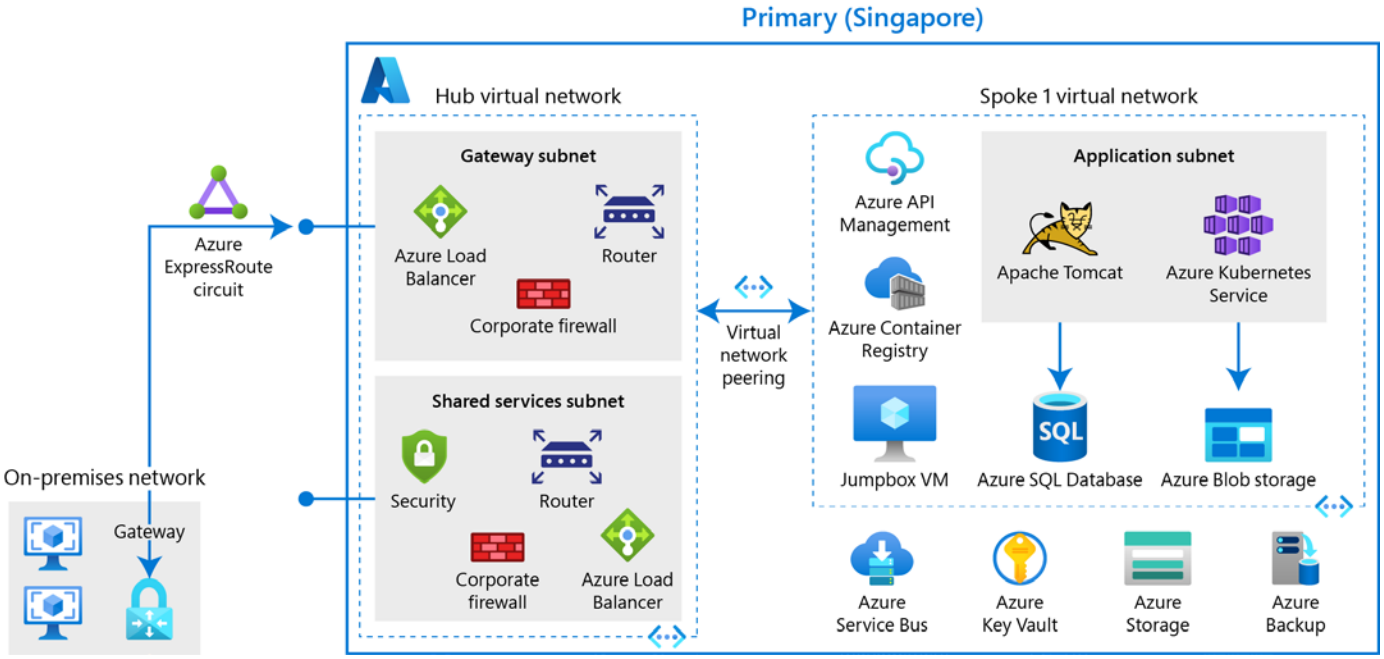

Figure 1: AIA Singapore primary data centre hybrid architecture

As part of its digital journey, AIA Singapore continues to roll out on Azure as legacy applications are updated and moved. The hybrid configuration is the perfect solution for them, connecting the company's existing on-premises data centre through a landing zone to the new Azure data centre.

> **Azure frees the team from the day-to-day heavy operational work to focus on creating core business values."**

Nedved Yang
Head of Digital Technology, AIA Singapore

Key benefits

- Improved application performance and scalability
- On-premises systems integrated with a hybrid architecture solution
- Increased productivity and accelerated delivery of innovative services

Learn related skills

- Learn more about migrating Tomcat to containers on AKS
- Azure landing zones

2.

Simplify development and deployment

For more than 150 years, Swiss Re, one of the world's largest reinsurers, has used data to make the world more resilient. Recognising that resilience requires finding new business models, the company uses Azure services to transform the insurance industry. Behind the scenes, the Swiss Re Group Finance IT team is responsible for providing a stable and accurate service for the business – especially during the all-important closing periods, when the company publishes its financial results. The company follows the Cloud Security Alliance Cloud Controls Matrix (CSA CCM), and all applications must meet the standards set by the Common Vulnerabilities and Exposures (CVE) system.

The move to Azure was part of a digital transformation initiative that the Swiss Re Group Finance IT team started to gain the continuous innovation and agility of cloud-native applications. To reduce the risk associated with refactoring monolithic applications, the IT team adopted the strangler pattern in its modernisation journey, where developers gradually update the company's Spring Boot applications and incrementally retire legacy systems. The Swiss Re Group Finance IT team also began investigating managed platforms to make life simpler for developers and enable a Zero Trust model, where any identities and devices on a corporate network must be continually verified.

Journey to the cloud

Swiss Re chose Azure Spring Cloud, a fully managed infrastructure for Spring Boot applications, to concentrate on writing apps and running them with minimal overhead. This allowed Swiss Re developers to focus on building their business logic while Azure took care of dynamic scaling, security patches, compliance standards and high availability.

The transition to Azure Spring Cloud was easy. Jonathan Jones, Lead Solutions Architect, Group Finance IT, points out how much the team liked the platform's simplicity. "We give it a JAR file and have an application running. We don't need a specialist DevOps engineer on call. For us, this makes good economic sense."

With Azure Spring Cloud support for popular integrated development environments (IDEs) and frameworks, the Java developers at Swiss Re could continue to work in their chosen environments. With a simple Spring Data JDBC call, the team can store and retrieve information in Azure Database for PostgreSQL, a managed version of the popular open-source PostgreSQL database. Another benefit of moving to the cloud is more observability and, with Azure Monitor integration, the team has access to aggregated logs, metrics and distributed app traces in one place to help with troubleshooting.

Before the platform went live, Swiss Re subjected Azure to a tough battery of performance and penetration tests and Azure Spring Cloud passed on all counts. Azure Spring Cloud supports the company's strict security and regulatory requirements and provides worldwide reach, which was a key consideration in the move to the public cloud. Swiss Re lowered the attack surface by delegating network and compute management to Microsoft. The Swiss Re team designed an architecture that is simple, but where security is paramount.

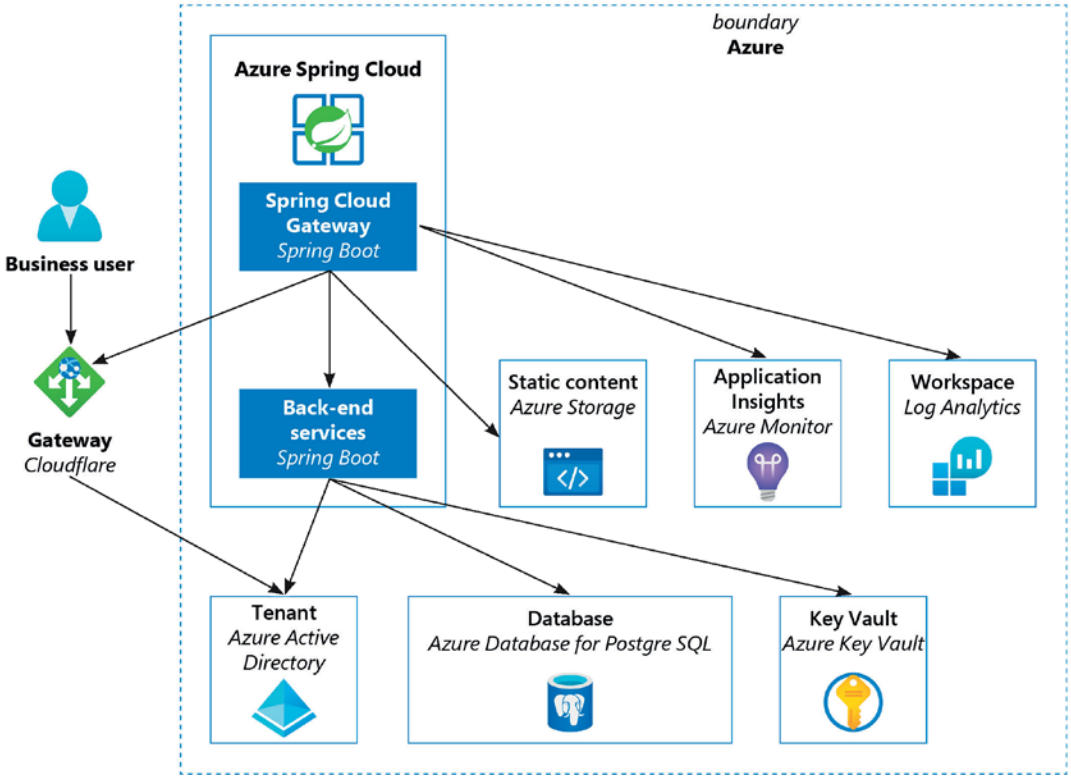

Figure 2: Swiss Re hosting its Spring Boot applications on Azure Spring Cloud

Swiss Re accelerated its modernisation efforts by hosting its Spring Boot applications on Azure Spring Cloud. The team has created a runway for app development and paved the road for other squads within Group Finance IT.

> We wanted something that was secure, easy, developer-friendly and operations-friendly. Azure Spring Cloud fitted our strategy."

Jonathan Jones
Lead Solutions Architect, Group Finance IT, Swiss Re

Key benefits

- Accelerated time to market
- Enforced security and governance
- Simplified operations and infrastructure

Learn related skills

- Azure Spring Cloud
- Learn how to move Spring Boot apps to Azure Spring Cloud

3.

Create multi-tenant solutions and meet global customers' needs

Headquartered in the United States, Sphera serves thousands of organisations in more than 100 countries and reaches more than one million individual users. Customers come from a broad range of industries like energy, manufacturing, chemicals, consumer goods, retail and government.

Sphera is in the business of creating a safer, more sustainable and productive world. With the recent acquisition of a Java EE technology for Operational Risk Management (ORM), Sphera opted to consolidate its portfolio and go cloud-native on Azure. The move gave the ORM engineering team the opportunity to reimagine it's packaged software as a secure, multi-tenant Software-as-a-Service (SaaS) offering called Sphera Control of Work (CoW).

The Sphera engineering team wanted to focus on the domain and features, and as little on infrastructure as possible. That meant using as many PaaS and SaaS services as possible.

Journey to the cloud

As a long-time Microsoft customer, Sphera contacted for information about the best way to move its Java EE workloads to Azure. Microsoft invited the Sphera team to join a Java EE migration pilot where they could work with Azure engineers on a proof of concept. The initial goal for the migration was to migrate the Java EE apps to Wildfly on Azure App Service for Linux, a managed hosting service for web apps, REST APIs and mobile back ends.

During a week-long migration marathon, not only did the engineers get the app running in just three days, but they also checked off a laundry list of optimisations. "We did not have any experience with Azure, so our goal was to get on Azure and deliver a minimum viable product. But our progress was way beyond our expectations!" says Brian Laird, Vice President of Engineering, Sphera. However, the biggest win was transforming the stateful Java EE apps to scalable, stateless apps on Azure App Service for Linux.

During the migration, the team also accomplished more than they expected in the data tier. The original product's EclipseLink in-memory cache was traded for Azure Cache for Redis, a fast, fully managed in-memory data store. App data was copied from an on-premises database to Azure SQL Database in a move that took little more than a day. "Without doing any development work, we had multi-tenancy for free on the database level. We can also update all the databases at once. I consider the Azure SQL offering probably the biggest advantage Azure has over other competitors," says Albion Hoxhaj: Head Architect, Sphera.

Today, the Sphera CoW architecture on Azure runs the core Java webs apps in a flexible Azure App Service plan. For simplicity, two third-party components were migrated to Linux VMs.

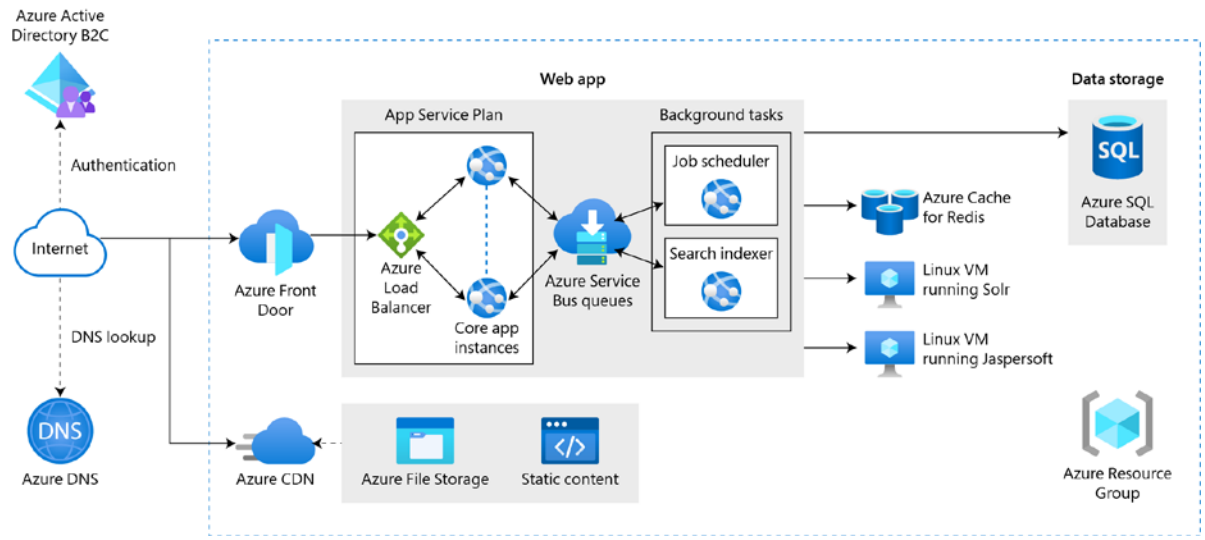

Figure 3: The Sphera CoW architecture on Azure runs the core Java web apps in Azure App Service

Migrating the deep Java EE stack to Azure happened in phases. After the migration marathon, the team set up and tested a single-tenant SaaS cloud solution. However, to share the compute cost among different customers, Sphera envisioned a multi-tenant solution. For that, it needed to provide a secure sign-on experience that was achieved by turning on another managed service – Azure Active Directory B2C, which provides business-to-customer identity as a service. Today, all the Java workloads are attached to Azure AD B2C.

The Java EE CoW migration was just one part of the larger effort to build a multi-tenant cloud platform with the scale to serve more customers. SpheraCloud is changing the way that global customers conduct their business and making them much more effective. A company may start with Sphera CoW, but the integrated nature of SpheraCloud on Azure makes it easy for them to add more services.

> **Our strategy was to consolidate onto Azure and get the benefit of having everything in one place. Azure has made it easy to integrate our products and offer more to customers."**

Brian Laird
Vice President of Engineering, Sphera

Key benefits

- An expanded customer base with a secure, multi-tenant solution
- The team is able to focus on development instead of infrastructure
- Immediate scalability.

Learn related skills

- Run JBoss EAP/Wildfly apps on App Service
- Authentication and Authorisation in App Service

4.

Optimise, scale and drive innovation

Sacramento-based Raley's is a regional grocery chain that owns and operates more than 130 stores under six brands in California and Nevada. With some 11,500 employees, it's the largest family-owned company in the greater Sacramento region. The COVID-19 pandemic has driven a massive surge in online grocery shopping, making it an essential 24/7 service that must remain operational and stable. For US grocery retailers, the holiday seasons generate the biggest sales of the year, creating predictable usage peaks.

Raley's needed to modernise the code and infrastructure for their Java-powered e-commerce sites hosted on Azure. They had a mandate to address technical debt, and, with a lean IT team, they needed an efficient way to do so. Raley's wanted to focus on their applications, and not have to worry about infrastructure. They needed to improve utilisation, reduce costs and reduce time-to-value. Scaling had been largely manual, and a new solution was needed to speed up deployments. But the team only had about six months to do it. Everything needed to be launched and stabilised ahead of the US grocery retailer's busiest time – Thanksgiving.

Journey to the cloud

To improve both flexibility and resilience, the team decided to accelerate the migration to microservices and pivot to a continuous integration and continuous deployment (CI/CD) model. To modernise infrastructure, the team needed to optimise cluster orchestration, migrate from VMs and automate deployments and provisioning across the board. Most importantly, it needed autoscaling driven by real-time monitoring.

The answer was Azure Spring Cloud, a fully managed service for Spring Boot, providing the power of Kubernetes coupled with real-time monitoring and autoscaling. It also enabled Raley's to adopt a true Platform-as-a-Service (PaaS) architecture, seizing the benefits of the cloud more fully and focusing on delivering key business features.

"Azure Spring Cloud runs Kubernetes underneath for us," Armando Guzman, Principal Software Engineer at Raley's, observes. "It wraps it up in a nice little package, where all you have to worry about is the Java services and the Java. We don't have to manage Kubernetes ourselves or worry about any of that." In keeping with their focus on platform as a service, Raley's is using fully managed Azure Database for PostgreSQL for their data layer.

Raley's completely automated Java application deployments – from code managed in Azure Repos to application compiles and container builds using Azure Pipelines. The ease and speed of deployments have been a revelation to the team.

Spring Cloud apps are fully integrated with Azure Monitor tools, allowing easy, fully configurable monitoring of performance and quick error troubleshooting. Raley's used these same monitoring services to also drive autoscaling, helping to ensure that resources are appropriately sized for current loads.

The hardest challenge Raley's faced was the networking piece, as important parts of its network were not on Azure yet. Spring Cloud's support for deploying to private virtual networks (VNets) allowed Raley's team to use Azure API Management and Azure Application Gateway to protect the services from outside and inside the network.

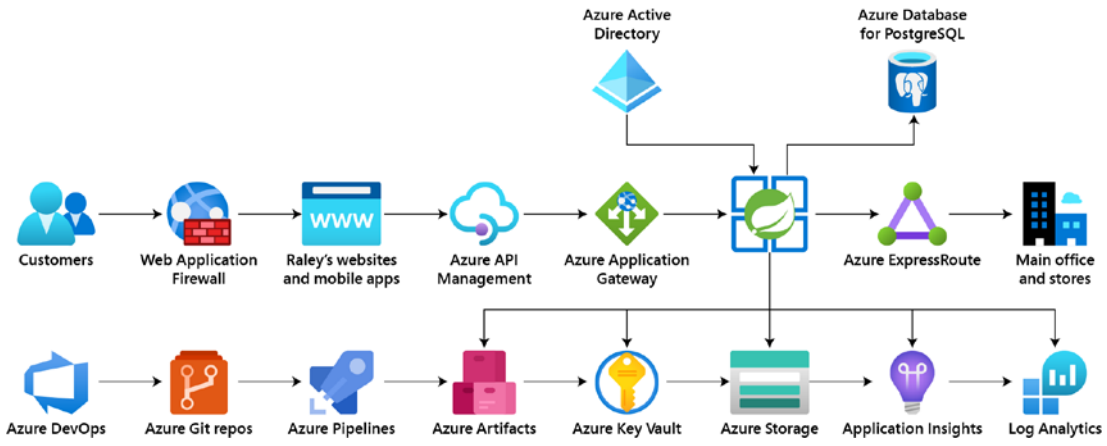

Figure 4: Raley's deploys apps to Azure Spring Cloud

Thanks to Azure Spring Cloud, Raley's team was able to launch two weeks ahead of its mid-October Thanksgiving deadline. Raley's had record-breaking e-commerce sales, and with autoscaling and all the new infrastructure that was in place, the company did not experience any outages during the holiday season.

> **Spring Boot and Azure Spring Cloud have enabled our developers to focus more on feature development and more frequent deployments without worrying about underlying infrastructure or monitoring."**

Abhay Kamble
Director, Unified Commerce, Raley's

Key benefits

- Ship new features faster
- Scale on demand during high-traffic seasons
- Increased customer satisfaction

Learn related skills

- Azure Spring Cloud reference architecture
- Automate application deployments to Azure Spring Cloud

Conclusion

Running enterprise Java applications at scale can be challenging. Azure provides a platform that includes compute, databases, monitoring, security, DevOps and more. Managed services, such as Azure App Service, Azure Spring Cloud and Azure Functions, simplify deployments and help teams to ship faster. "For data scalability and performance, you can use managed database services, including Azure Databases for PostgreSQL and MySQL, Azure SQL Database, Azure Cosmos DB and Azure Cache for Redis."

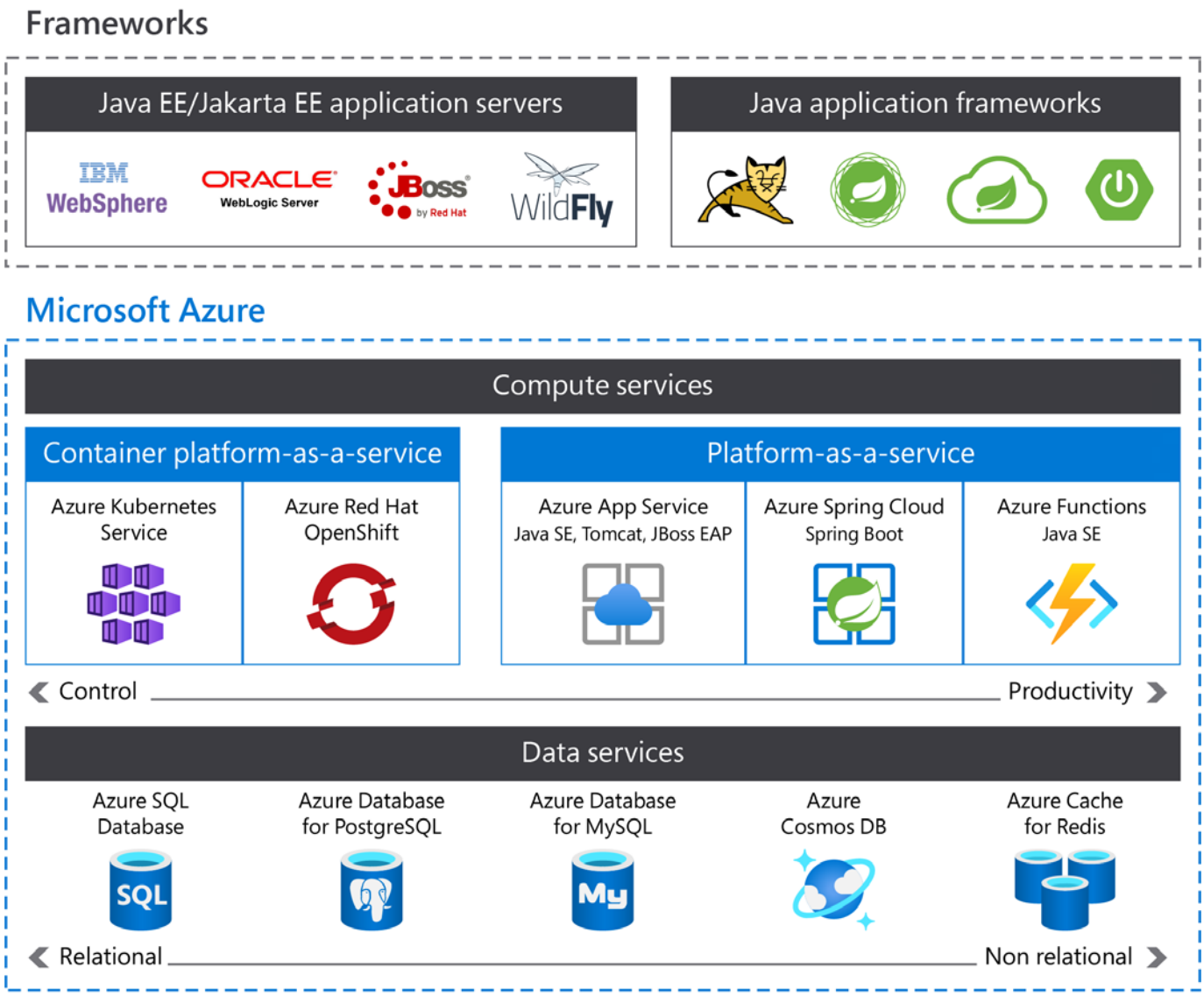

Figure 5: Compute and data services on Azure provide various levels of control and increased team productivity

Customers who require greater infrastructure control can deploy Java applications on AKS or Azure Red Hat OpenShift. Running on Azure provides access to a range of platform services, including Azure Monitor, Azure Key Vault and Azure Active Directory. These services help address some of the most common challenges in running Java apps in the cloud, including observability, secrets management and authentication and authorisation. With Azure, you can transform Java applications to achieve better performance, security and customer experiences.

Get started today

Java on Azure: Learn how to develop Java applications on Azure with tools and frameworks of your choice. Read more.

Free Training: Start self-paced Java on Azure learning path to learn steps necessary to build, migrate and scale Java applications on Azure. Start training.

Migration guide: Get started with the recommended strategies for migrating Java applications to Azure. Read documentation.

Azure Migration and Modernisation Programme: Get the expert guidance you need to start your cloud journey. Learn more.

Azure Sales Specialist: Connect with a team of specialists to answer questions you have about migration. Connect to sales.