Azul Disrupts the ROI Equation for High Performance Applications

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Executive Summary

Java continues to be the preferred choice for enterprises developing mission- critical platforms such as eCommerce, portals and electronic trading systems. Despite this popularity, the Java runtime (i.e. Java Virtual Machine) has lagged in meeting requirements for modern high performance applications that include lightning-fast response times and the ability to utilize massive amounts of data. Firms that rely on Java for their core platforms get mired in complex, time-consuming and inevitably unsuccessful tuning or re-architecting cycles, or create expensive, siloed performance-oriented specialty IT departments to deliver solutions using technologies other than Java. The result in both cases is a dramatic increase in cost, adverse impacts to the core business and projects that don't meet standard IT governance and ROI measures.

Azul's industry-leading and unmatched Java runtime, Zing, redraws the landscape for high performance applications and disrupts the underlying ROI equation by establishing the new Java standard for ultra-low latency, predictability and scalability. Zing enables firms to leverage the power of Java across the enterprise - even previously sacred high performance areas - by dramatically improving performance, resource leverage and ROI to deliver enhanced revenue opportunities and lower costs.

Challenges of the Real-time Enterprise

Over the past decade, large transaction processing applications with heavy resource requirements, such as portals, eCommerce and trading systems have become mainstream due to the growth of the internet. These mission-critical applications, many of which are based on the Java platform, face challenges that were inconceivable just a few years ago. Extreme requirements for performance, scalability and availability that were once needed only by select systems such as airline reservation systems or automated teller machine networks are now becoming prerequisites in the context of a competitive global market.

Business application owners are faced with incredible challenges and opportunities. With the ever rising bar of business and user expectations, the pressure to deliver has never been greater. This emerging Real-Time Business Imperative means leveraging new sources of data and technology to deliver more insight, capability and value faster than ever, with near zero tolerance of inconsistent delivery or user experience, often without adding people or capital investments.

The ROI Conundrum with Java

While Java has been a tried and true platform for delivering business critical applications, it is a generic "Swiss Army knife" environment, dating back from over a decade ago. Today's Java solutions are a product of this legacy, proving to be brittle, inconsistent and inefficient in meeting these new demands, constraining your growth, investments and opportunities. You are left over-investing in hardware and supporting, tuning and managing production apps, leaving new business opportunities on the table.

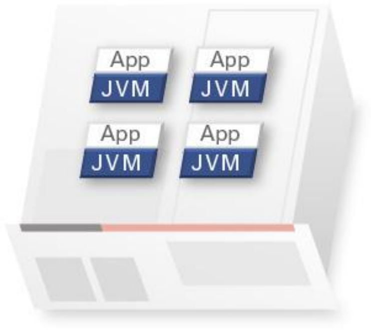
Traditional Java infrastructures constrain application performance, revenue and ROI in a variety of ways:

Inconsistent response times. Customer and business response time requirements are much more stringent today than they were just a few years ago. Trading, online advertising and other machine-to-machine systems demand response times in the microsecond range. Online services, eCommerce and other Web applications must respond lightning fast or risk losing sales. Current Java applications often violate these requirements because of the JVM's need to stop application processing for garbage collection when heap memory fills. Because the length of pause is linear with the amount of memory available to the application, beyond a memory size of a few GBs no amount of tuning can keep pauses low enough to meet modern response time requirements.

Businesses have reacted to these limitations by making less data available to individual application instances in order to meet response time goals. This reduces revenue and inhibits innovation by handicapping data-intensive applications such as analytics, product recommendation engines, clickstream tracking and online advertising placement. With less data available, application responses take longer and offers are less optimized resulting in lost business opportunities.

Operational inefficiency. With traditional Java runtimes, the memory size allocated to the application is fixed when deployed and can't change dynamically based on real-time demand or workload. The resulting risk of crashes causes IT departments to over-provision memory and CPU for each application to handle peak workloads, creating inherent operational inefficiency and lowering hardware resource utilization. The lack of real-time scalability also impedes rapid growth in online services and constrains the ROI of Cloud deployments where resource elasticity is a key driver of savings.

Development and IT time is also disproportionately spent trying to "tune away" application pauses and fix performance issues with existing applications, instead of building new capabilities and pursuing new business initiatives.



Before Zing: Many, Small Rigid Instances

Barrier to innovation. To compete, you need to innovate. Java makes it easy to build new capabilities, but very hard to deliver them quickly and reliably at scale. In the past companies have avoided launching new services in the Cloud, limited the amount of data available to the application, disabled compelling features (such as social and real-time interactive) and even decided not to launch new customers to ensure delivery against response time goals and SLAs. This has put business opportunities out of reach that could have created new revenues and competitive advantage.

Traditional Java infrastructures hamper innovation in other ways, too. When changes are made to existing applications, extensive performance tuning cycles lengthen launch times and put the company at a competitive disadvantage. Development and IT hours are further eaten up on unproductive operational overhead managing existing production issues instead of being used to advance the business.

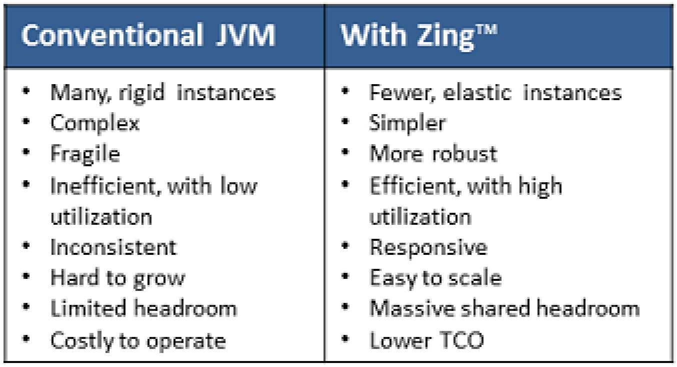
The above limitations dramatically change the ROI equation for high performance application development and delivery. Costs jump and applications fall short of meeting business requirements. Firms are forced to either 'double-down' and pursue a costly, less-than optimal Java-centric path or abandon Java for other technologies. Starting over via the creation of specialized performance-oriented IT departments reduces ROI further by introducing unexpected new costs to the firm.

Introducing Zing: The New Standard for High Performance Java

Zing from Azul Systems is the new Java performance standard. Zing offers unprecedented levels of scalability and throughput and enables existing Java applications to scale smoothly and reliably to meet and exceed the requirements of modern applications. Zing is the only JVM that enables applications to scale dramatically without variations in response times. Azul's "awarding-winning" and highly innovative Pauseless Garbage Collector (C4 - Continuously Concurrent Compacting Collector) removes the risk of pauses while Zing's elastic memory allows instances to grow and shrink based on real-time demands.

Optimized for Linux and x86, Zing's elastic architecture can automatically scale individual Java application instances up and down in both core count and memory size, based on real-time demands. This unmatched, ultra-low latency performance takes Java to the next level for a variety of real-time applications:

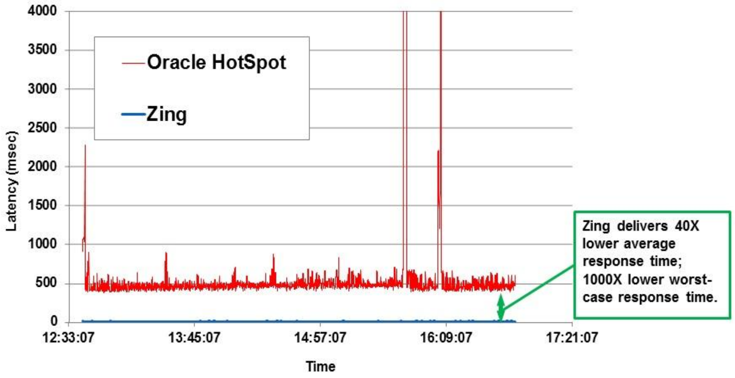
- Large or variable numbers of concurrent users
- High or variable transaction rates
- Low latency requirements
- Large data sets
- Caching, in-memory data processing
- ESBs, SOA, messaging
- Multi-tenant SaaS, Platform-as-a-Service (PaaS)
- Virtualized and Cloud deployments



Conventional JVM	With Zing™
• Many, rigid instances	• Fewer, elastic instances
• Complex	• Simpler
• Fragile	• More robust
• Inefficient, with low utilization	• Efficient, with high utilization
• Inconsistent	• Responsive
• Hard to grow	• Easy to scale
• Limited headroom	• Massive shared headroom
• Costly to operate	• Lower TCO

Comparing Zing to a Conventional JVM

In addition to a fully Java-compatible JVM which installs and launches like any other commercial JVM, Zing provides a monitoring platform that delivers true, zero-overhead, always-on production-time visibility into running applications.



Zing delivers 40X lower average response time; 1000X lower worst-case response time.

As an example of the dramatic capabilities of Zing, consider the real-world results shown in the picture to the right. Zing delivered an average response time 40X lower than a tuned Oracle JVM, and a 1000X reduction in worst-case response time. Same application, unchanged code – different JVMs. Zing delivers better Java performance, consistency and reliability for all types of apps.

The Bottom Line on Zing

Zing aligns the ROI equation for high performance applications with the needs of the enterprise by addressing limitations associated with standard JVM technology.

Application Development Costs. Zing enables firms to leverage their existing Java expertise for high performance applications rather than creating siloed performance-specific teams that increase costs to the firm. Moreover, Zing is seamlessly integrated into existing environments with no special requirements meaning that the enterprise can continue to benefit from Java's proven productivity advantages and unmatched developer community.

> **Use case: Financial Institution**
> This financial institution relied on Java for their primary platforms. However, a high performance risk modeling routine couldn't meet performance goals and ultimately had to be outsourced to a 3rd party vendor for a non-Java solution. Zing provided the opportunity to bring the solution back in-house to their core Java development team. The company was able to eliminate over $1,200,000 in annual external development and support costs.

Performance Tuning. Regardless of technology, the impact of performance tuning spans the entire product lifecycle from development to QA and to production. However, Zing uses a single tuning parameter that eliminates costly iterative performance tuning cycles that increase cost and delay delivery, adversely impacting the core business. Azul also brings deep hardware and operating system expertise to the table that complements existing enterprise knowledge and eliminates the need for costly specialty resources.

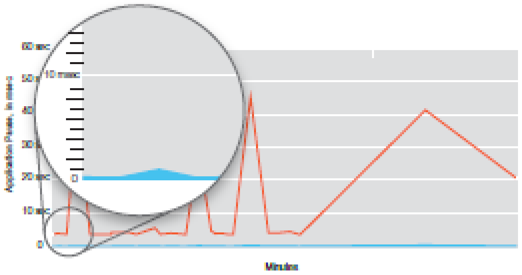
> **Use case: Online retailer**
> This major online retailer was able to shrink the overall product launch schedule by reducing performance tuning associated with development, testing and production support. The operational benefits and ROI case for Zing was compelling. The company's product development and deployment model allocated an average of 120 man-days annually for performance tuning per application. At an average of $500 per man-day, this equated to approximately $60,000 per application. In the context of 4 core high performance applications, the gross cost to the firm was $240,000 per year excluding the opportunity cost of lost revenue due to product delivery delays. With Zing, the tuning time was reduced by over 90% resulting in annual savings of over $200,000.

Availability. Zing's industry-leading innovative C4 Pauseless Garbage Collection algorithm provides unmatched ultra-low latency which dramatically enhances application availability.

> **Use case: High Frequency Trading**
> This major financial institution estimated that excessive application latency caused by garbage collection events (i.e. pauses) at market open and close were exposing clients and internal traders to adverse selection or lost opportunity. The pauses affected approximately 100 orders

per day with an average notional value of $18,000 per order. Annualized, this equated to approximately $360,000,000 in exposure to non-deterministic application risk manifested in the form of lost commissions, increased slippage and profit opportunities. Zing eliminated over 99% of the latency risk associated with market open and close resulting in an estimated reduction in net technology-related notional risk to under $3,000,000 annually.

Scalability. Zing's unmatched scalability creates a new paradigm for horizontal and vertical scaling. Zing squeezes more performance out of each application instance on a given machine, translating into a smaller data center footprint. This straight-to-the-bottom-line impact is also enhanced with lowered ongoing maintenance and support costs via a leaner application and hardware infrastructure.



Azul Zing reduced peak pauses from over 40 seconds to under 5 milliseconds

Use case: Social Gaming

For this social gaming customer, 8,000 users were pushing the infrastructure to its limits and causing sub-par quality of service. After deploying Zing and without any hardware changes, the same hardware footprint was able to accommodate up to 20,000 concurrent users with dramatically increased quality of service. The firm realized $50,000 per month in increased revenue in just the first few weeks due to the increased user base.

Experience Zing Today

At Azul, we have one thing in mind: Java performance. We strive to ensure that our customers can rely on Java-based applications for their business-critical services, revenue growth and innovation without worrying about scalability, reliability or outsized infrastructure investments. To that end, we deliver the best Java runtime in the world, a very stable, superior, robust JVM with predictable high-performance and low latency capability, a JVM with all the features built in. Zing eliminates most of the typical Java challenges and performance and scaling barriers, so your team can focus on the features and functions of your application or service, and you can focus on growing your business. We invite you to experience Zing with a no-risk free trial that includes an assessment of your existing Java environment so that you can quantify the ROI of Zing.

ZING BENEFITS

- Consistent performance, even under heavy load
- ~40X lower average response times and ~1,000X lower worst-case response times
- Ultra-low latency

Contact Azul

To discover how Zing can improve Java application performance and deliver fast ROI to your business, contact Azul today.

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