AZUL TECHNOLOGY WHITE PAPER

Reducing CAPEX and OPEX with Azul Zing®

This paper highlights ways in which Azul Zing, a better JVM, can reduce operating costs and bring value to your business.

Given the extremely wide adoption of Java for server-based applications worldwide, reducing platform and support costs is an ongoing imperative. While Java use cases vary widely, the need to continuously prioritize investments, control costs, and measure impact, is universal. Typical bottlenecks in engineering tend to delay time to value, introduce risk factors, consume valuable engineering resources and possibly delay deliverables that could easily result in lost revenue.

Azul Zing Overview

Azul's Zing runtime for Java (a JVM, in other words) extends Java's distinct advantages in many instances by providing a robust, highly scalable Java Virtual Machine (JVM) that matches the needs of today's business, from newly developed microservice-based applications to long-running legacy systems. Zing is a JVM that is compatible and compliant with the Java SE specification and is designed to handle a wide span of enterprise applications and workloads.

With Zing, Java-based applications will run more efficiently, are more scalable and will experience far lower peak latency when compared with the results of any other JVM.

Zing makes deployment simpler, with fewer instances and less tuning; allowing Operations teams to have more flexibility in deployment type, such as enterprise clouds or virtualized workloads. Zing also provides always-on monitoring tools to optimize performance on production (running) systems. Zing excels by providing "better behavior" – enabling sustained performance, faster warmup and predictable latency without the pauses, jitter or application timeouts that often plague Java applications in production. Plus, Zing delivers pause-less operation without regard to an application's memory requirements, up to a staggering 8 Terabytes.

Online review site saves $500K by deploying Azul Zing

A recent Zing implementation targeted a site that connects brands and retailers to authentic voices of people where they shop. Each month, more than 700 million shoppers use a variety of mobile devices to view and share opinions, questions and experiences about tens of millions of products.

PROBLEM: Missing target response times

Our customer was having difficulty meeting their response time SLAs using Oracle HotSpot. As a result, they needed to keep increasing their Amazon AWS.

Azul Zing solved their SLA issues. Could they justify the cost of Zing?

The customer used c5.9xlarge AWS instances, and was not meeting their performance targets while using 6 clusters with 24 AWS data nodes per cluster.

With Zing, each cluster's 24 data nodes were able to be reduced to 15, while meeting all their performance and response time targets.

SUCCESS: 90 Azul Zing licenses resulted in a $500K annual savings

Zing enabled this customer to meet their service levels and support fluctuating traffic levels with fewer AWS instances. Operating Zing also required far less technical troubleshooting and far less management time. In the end, this customer experienced significant cost savings on their AWS environment as they continued to grow, plus performance and throughput improvements.

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Azul Zing drives down costs with better code

Falcon, Zing's high-performance optimizing JIT compiler for Cloud and on-premise applications, was designed to replace the legacy "C2" JIT compiler that is part of every build of Oracle HotSpot and OpenJDK. The (C2 JIT compiler was used in prior versions of Zing.)

The goal of Falcon was to deliver genuinely better (more highly optimized) code, using breakthrough technology from the open source LLVM compiler infrastructure project.

The LLVM project is supported by more than 100 companies who contribute top-flight engineers to ensure that languages using LLVM technology get the best possible performance and latest optimizations available from industry and academic sources.

Falcon JIT compiler advantages:

Better application service level metrics:
- reduced peak and average latency
- reduced timeouts
- better consistency

Improved customer experience:
- reliably achieve customer expectations even under unpredictable load
- improve customer satisfaction

Lower operating costs:
- reduced memory footprint requirements
- improved load carrying capacities on similarly sized instances or servers

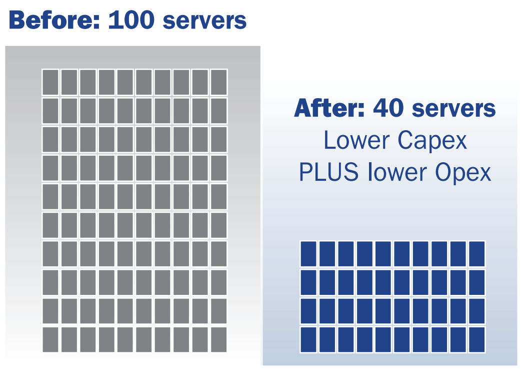
Lower engineering and management costs:
- fewer engineering hours required to achieve desired performance, consistency and scale
- no need for outside performance consultants
- fewer management cycles

Azul Zing enables better resource utilization – no need to over-configure servers

Since Java use became widespread within the enterprise, the standard practice embraced by Operations teams was to scale out rapidly, ensuring that any given server was likely to be running at or below 20% resource utilization on average.

Scaling out helped prevent resource spikes or Java's memory management artifacts from impacting business operations – but it did mean provisioning server resources far above the levels that were actually required.

With Zing, there is no need to keep systems underutilized to ensure adequate performance. Zing can handle 2-3x more users or transactions on existing hardware while meeting service level requirements and throughput targets. Enterprises can now dramatically simplify Java deployments by using fewer instances while achieving improved response time consistency under load.



Bottom line: Zing reduces cost and improves your ability to meet required service levels – without re-architecting your software.

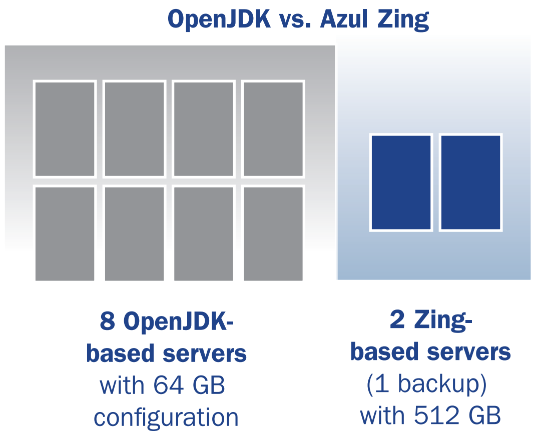
Azul Zing reduces in-memory computing costs

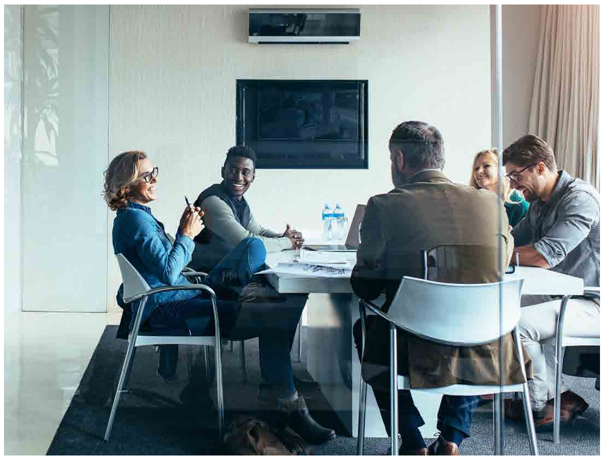
Managing and mitigating systems like those that target real-time risk analysis is better achieved with Zing.

In many cases, memory-intensive applications start by using arrays of objects on the Java heap, but quickly find that with Oracle HotSpot or OpenJDK the side effects of garbage collection quickly throttle performance – driving the data off-heap into a variety of caching solutions that can add licensing and support costs as well as development complexity to any design.

With Zing, the Java heap can grow without stalls, pauses, or glitches. Zing can make use of all available memory – from a single GB up to 8 TB in very large server instances.

Because a single instance can scale to whatever memory footprint is desired, Zing can dramatically reduce the total number of servers needed to support enterprise applications or multi-tenancy SaaS/PaaS solutions, simplifying deployments, dramatically improving response time consistency and thereby further reducing risk and increasing reliability.


OpenJDK vs. Azul Zing
8 OpenJDK-based servers with 64 GB configuration
2 Zing-based servers (1 backup) with 512 GB



Azul Zing drives down Cassandra costs

Europe's leading independent publisher monetization technology provider is committed to increasing revenue for media owners. Their innovative platform automates and improves the monetization of advertising and audience, across all screens, and through public and private channels, supporting the marketing efforts of tens of thousands of advertisers.

The core ad-serving platform generates revenue by acting like an exchange auction with real-time bidding for adverts within the advertising network. Facing hundreds of millions of transactions per day, the publisher deployed a Cassandra cluster running on 6x AWS i3.2xlarge.

The challenge:

Service Level requirements were 20ms at 99.9% / 50ms at 99.99% / 100ms at 99.998% (not a typo, the last 9 is hard to maintain on AWS).

Oracle HotSpot w/G1 maintained ~4k Transactions per Second (TPS) before a Service Level breach.

On the same configuration, Zing maintained ~21k TPS before a Service Level breach.

The result:

500%+ greater transaction load per node without breaching required Service Levels.

Immediate increase in throughput PLUS greatly reduced AWS costs.

Plus, the publisher was able to use fewer engineering resources to achieve a better performance outcome with lower overhead and spent less time having to tune for improved performance and resolving critical issues.

Azul Zing helps reduce operational risks and gets you to market faster

Zing changes the Java production landscape not only from a budgetary point of view, but also by streamlining technical efficiencies through reductions in overall engineering resource requirements, including reductions of technical risk, which have a direct impact on the ability to meet key strategic deadlines, or time-to-market. Most project leaders understand that Java applications are often business-critical and mission-critical. Performance and scalability issues that affect revenue and usage are often not due to the application, database or network but are more often related to the choice of JVM.

Azul Zing allows you to succeed without re-engineering, re-designing, or re-architecting your existing software

By choosing Zing, you can eliminate unexpectedly long wait times for users and out-of-memory crashes to capture lost revenue and customers and deliver a consistent user experience even when demand spikes unexpectedly. Zing will help you meet your business objectives without re-engineering your existing systems. You'll deliver a better customer experience, support more users on your existing infrastructure — and you'll be able to deploy new features faster than your competition, reliably!

Zing has proven its ability to be a more effective and efficient solution when powering legacy software. It enables Java developers to make efficient and effective use of server resources or VM instances, without the random stalls, pauses, and jitter that have been part of Java's heritage. With Zing, companies can free up their key and expensive developers to focus their time on adding new product features and capabilities instead of tuning and re-tuning production systems.

Meeting internal and external service level commitments despite unexpected workload spikes or rapid growth in demand can be a huge problem, especially if missing the launch date becomes a factor. Zing helps to meet business objectives and service level commitments, without having to re-engineer existing systems. Businesses receive a better customer experience, support more users on existing infrastructure, and deploy new features faster than their competition. Customers have shown they can manage 2 – 3X more users or transactions on existing hardware while meeting their service level requirements and throughput targets. All while being *on-time*.

Summary: Azul Zing helps reduce your operating costs

Zing helps you meet your business objectives without re-engineering your existing systems. You'll deliver a better customer experience, support more users on your existing infrastructure — and you'll be able to deploy new features faster than your competition. Java applications are often business-critical and mission-critical.

Performance and scalability issues that affect revenue and usage are often not due to the application, database or network but are more often related to the choice of JVM. By choosing Zing, you can eliminate unexpectedly long wait times for users and out-of-memory crashes to capture lost revenue and customers and deliver a consistent user experience even when demand spikes unexpectedly, thereby reducing overall CAPEX and OPEX costs over time.

Zing is simple to install and requires no coding changes to existing applications. There is no need to recompile, redesign or re-architect. Because Zing has been optimized for today's latest servers and AWS instances, configurations and setup are typically reduced to just a few parameters, instead of the myriad of JVM tuning flags necessary to reach peak performances that characterize many Java-based production environments. Simply point an application or startup script to Zing, and it can run on the most robust, scalable JVM with the fastest time-to-market for any business application.

Try Zing onsite today – free. Download Zing from an Azul repository and try it yourself for up to 30 days through the Zing trial program. To request an on-site evaluation and work with an Azul expert, contact us at info@azul.com.

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