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System z – delivering on the full promise of business intelligence

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Executive summary

In a nutshell

As business intelligence (BI) continues to evolve from a specialised back-office function and expand into front-line business operations, a 'modern' class of mainframe has emerged as a viable and compelling platform on which to run BI and analytic applications. This report explains how the hallmark strengths of System z – performance, application availability, reliability and security – are well suited to meet modern BI requirements that are becoming more complex and realtime in nature.

Ovum view

In the current economic downturn, companies are assessing both their business needs and IT systems capabilities in the context of cost containment and minimising complexity.

Investing in distributed Unix and Windows server clusters for corporate IT computing needs is not always feasible or desirable, especially in the cycle of a downturn. Many enterprises are now delaying purchases of new server arrays and electing to keep their legacy mainframes in place and extend these platform investments by adding new sources of value that are strategic to the business.

One area they should seriously consider is business intelligence (BI). Now a business necessity, rather than a luxury, to compete in today's market, BI can be considered a mission-critical application. Over the past several years the BI market has evolved rapidly and is trending in a direction that makes it an ideal candidate for running on mainframe systems. BI is a data-intensive activity that is becoming more pervasively used and operational in nature. As such it requires a distinct architecture that blends databases, software application and hardware to enable fast access to business data. It is therefore critical that BI is underpinned by a robust and agile data management architecture.

In parallel mainframe technology has also advanced to become a more viable and competitive platform for running enterprise BI applications. Modern classes of mainframe systems like System z have also been updated with new and emerging technologies such as service-oriented architectures (SOA), virtualisation and Linux to enable them to interface more easily with BI environments and be a good citizen of the corporate IT infrastructure.

The mainframe model has already proved almost infallible for online transaction processing (OLTP) applications. And we see no technical reason why it can't do the

same for running strategic, tactical and near-realtime operational BI applications. Therefore marrying modern BI requirements to the proven speed, scalability, mixed workload performance capabilities and reliability of System z makes sense.

Companies that have implemented System z for running transactional applications might have in fact invested in the right platform for running BI and analytic applications, even if they had never intended to do so in the first place. And by adding BI, companies can also raise the strategic value of their System z investments.

Big Iron BI – mainframes and BI evolve together

BI grows up

BI now ranks as an important strategic IT investment for CIOs who are being asked to leverage business information to contribute to corporate growth. BI technology can help organisations reduce their costs, optimise business processes and increase productivity.

BI refers to a broad set of tools, applications and practices for collecting, analysing and presenting historical, current, and predictive views of business information to enable more informed decisions and increase businesses efficiency. Decisions range from operational issues, requiring immediate resolution, to longer term strategic issues. At the heart of decision making is timely access to 'quality' information, meaning that it has to be accurate, consistent, complete and up-to-date, and highly accessible to the business users.

BI, as an IT discipline, has evolved rapidly over the past several years from the traditional batch-driven extract, transform and load (ETL) data warehousing model which worked well for simple, predictable and non-time-sensitive queries and analyses. Today's BI requirements are very different. BI has become more pervasive and has broadened out across the enterprise to engage more types of analysis and users, ranging from executives, analysts and power users to provide strategic high-level analysis and trending to front-line business users to support their daily operational tasks around sales, marketing, customer management, manufacturing and other core functions.

The application of BI to operational processes has also raised the bar considerably in terms of data scope, scale and analytic performance. The amount of data that businesses collect has reached unprecedented terabyte levels. Companies are capturing new types of information – unstructured documents and semi-structured XML data – that also has decision-making value. Hence BI is being challenged to handle more and different types of data than ever before, and to make this readily available online to the appropriate managers and knowledge workers, when and how they need it (via web, mobile or everyday desktop applications such as Office).

BI has also had to evolve to keep up with the increased rate of change in today's fast-paced business environment. Increasingly many BI users now expect, and need, more immediate access to BI information. They need detailed information about the state of the business today, not last month, so they can visualise and analyse problems and make better day-to-day decisions around core business functions like sales, customer service and manufacturing. BI use is also getting more sophisticated, evolving from historic 'rear-view' reporting and analysis to forward-looking predictive analysis.

Simply put BI is getting bigger, faster and more sophisticated, all at the same time, and plays a key role in enterprises by providing mission-critical data. That has serious architectural ramifications, not least the choice of platform upon which BI and analytic applications can be run effectively. BI therefore needs a platform that matches its evolving technical and business needs while not adding to the complexity of the IT infrastructure.

The evolving mainframe – alive and kicking

The venerable mainframe architecture has now gained a reputation for being the trusty and reliable workhorse for business computing. Its proven strengths of mainframe computing platform – operational efficiency, performance and scalability, undisputed reliability and infallible security – are well documented in IT circles and it continues to be a permanent fixture in many corporate data centres today, entrusted with running the company's most mission-critical transactional applications.

Mainframes however have a bad rap. They have traditionally been perceived as the legacy business computing platforms of yesteryear – costly to maintain and difficult to run applications like BI on. But reports of the mainframe's demise have been exaggerated. Global mainframe use continues to hold steady for high-volume transactional processing, particularly in financial services and retail environments. Mainframe revenues are rising and overall computing power capacity – measured in MIPS (millions of instructions per second) – is at an all-time high. IBM, for example, reported a 25% rise in revenue for System z mainframe server products and a 32% increase in MIPS capacity, the highest level ever recorded for mainframe workload, in its quarter ending September 2008.

The resurgence of interest and investment in mainframes is being driven by trends in IT pushing towards application consolidation, server virtualisation and sustainable 'greener' data centres. Mainframes have sizable capacity and are natural IT consolidation platforms for organisations seeking to rationalise multiple operating systems, servers, data sources and even vendor relationships. Mainframes have also excelled at virtualisation for several decades, support advanced techniques for hosting and emulate multiple logical servers and operating systems on a single platform. Mainframes are also energy/space-efficient platforms that if properly configured can provide the same processor capacity of a distributed server farm while using just a fraction of the amount of electrical, HVAC

and floor space requirements, which ultimately helps a corporation reduce its carbon footprint.

The 'modern' mainframe

Advances in mainframe technology and design have also helped. While the mainframe's hallmark strengths have remained intact, the platform has also constantly been advanced. IBM's System z represents the 'modern mainframe' system of today and incorporates numerous technological advances and richer functionality like specialised and parallel processors, powerful virtualisation and workload scheduling and management models and software that hosts multiple operating systems. It also embraces new technologies like SOA, open source (Linux) and Java. Hence System z is as modern, if not more, than any other computing platform used in corporate IT today.

These points should not be lost on BI, whose evolving set of requirements around scale, performance, availability and reliability now make it a prime application candidate for System z. However, Ovum believes that's an opportunity that has yet to be fully realised. Today data warehousing and BI account for less than 30% of the applications run natively on System z.

This research presents a case for organisations that have implemented System z, primarily to run their transactional applications, to also consider BI as a viable strategic application for their platform as they strive to deliver more decision-support capabilities across the enterprise.

System z – a BI-ready platform

BI considerations

Before explaining why BI is a prime candidate for System z consideration, it is important to understand the key technical considerations when implementing a BI solution.

Spectrum of business users and needs

As BI spreads its wings into the mainstream enterprise business it needs to provide flexible and suitable query, reporting and analysis tools, applications and interfaces that match a variety of business user needs. For example, business analysts might require highly advanced analytics and use statistical analysis and data mining tools, while front-line business users might require simpler analyses and reports that may be event, process or application focused around day-to-day activities. The BI system should therefore be able to handle a mixed range of BI workloads with consistent performance across all types of queries.

Data sourcing strategy

BI has historically been concerned with querying, analysing and reporting on historic data that proliferates on a variety of systems. This typically involves moving data from source into an analytic data warehouse or data mart. This batch process is fine for strategic (long-term) analysis. With BI becoming more near-realtime in focus more granular and timely access to data becomes critical. Any BI system needs to be built on a robust data management foundation that ensures BI reports and analysis are being fed by clean, consistent, timely and complete data. Closer proximity of BI data to transactional data sources certainly helps. Co-locating both on a single platform removes much of the data integration complexity and data quality, consistency and security issues that often plague BI projects.

Cost of deployment

Like any major IT initiative the total cost of ownership (TCO) and return on investment (ROI) of BI technology has increasingly fallen under the spotlight. Traditionally BI has never been a particularly cheap nor easy technology to implement, which makes rapid deployment an imperative. The less time a company spends building and implementing the infrastructure and the quicker it gets business users running reports and performing analysis is the key to realising quick and tangible ROI business benefits from BI.

Part of reducing TCO is being able to leveraging your existing platform investments. All of the above BI considerations put a premium on the underlying BI platform's scalability, performance, availability and security. The mainframe has already proven itself a mission-critical platform for transactional processing. Therefore it makes sense to also run other mission-critical applications like BI on it that add a new strategic source of value.

Matching BI requirements to System z strengths

So what makes BI an ideal application for System z and how does System z meet those requirements? In this section we map the key technical and organisational requirements for modern BI deployments against the strengths of System z.

BI is becoming more mission critical to business operations

BI now plays a key role in providing mission-critical data for analysing and improving most of an organisation's business operations. Hence a BI system needs to be flexible enough to engage business users at all levels of the organisation, allowing them to access, understand and act upon BI information in the context of their daily business processes. Typically these types of information requirements are outbound facing, focusing on customers and partners to support – for example, insurance claims, customer shipments and procurement processes.

BI therefore needs to be woven into the fabric of the day-to-day operational environment, but in such a way that it does not disrupt operational systems or create a complex and expensive infrastructure to maintain. The application of BI to

operational applications and processes also raises the ante for data accessibility, mandating easy, uninterrupted access to a variety of transactional data sources, sometimes as quickly as it is captured. The proximity of BI applications to where the transactional data is captured and resides therefore becomes a key factor. Co-locating both on a single platform makes sense.

The mainframe is well designed to deliver such an environment while at the same time preserving high availability to meet these near-realtime BI needs. System z offers proven availability, resilience and reliability thanks to fault-tolerant features like dynamic disk swapping and operating system recovery capabilities. Downtime or unplanned outages are rare events, which is critical for delivering mission-critical BI data to the enterprise.

System z also has the capability to co-locate BI and analytic processes and data on the same server as the source transactional data – estimates say over 70% of a company's transactional data still resides on System z today. That not only addresses latency issues around data access since data is not being shunted in between different server environments. BI also benefits from System z's ability to efficiently manage concurrent sharing of data between batch online transaction processing and near-realtime analytic processing applications. Importantly it also removes much of the latencies found in traditional BI data integration processes.

BI needs high performance and scale

Many organisations are looking to scale performance of their BI deployments in terms of data volume and user access – an inevitable consequence of BI evolving from strategic back-office tools to enterprise-wide applications. Companies must be confident that their BI software and hardware platforms can scale linearly and cost effectively to meet these demands with minimal disruption to performance. Companies expect BI query response times to mimic the near-realtime nature of business operations – a requirement that is amplified in large-scale BI environments that serve thousands of users running simple and complex queries, analyses and reports, sometimes concurrently, against terabytes of data, and against ever-shrinking processing timeframes. Companies must also safeguard the performance of transactional systems that they are constantly accessing data from. However, forecasting the amount of computing power and space needed to maintain performance levels is difficult in distributed server environments, especially as companies evolve from strategic to enterprise-wide BI deployments.

System z's scale-up (as opposed to scale-out) approach provides sufficient headroom to incrementally add processing capacity without the complexity inherent in adding to large server arrays. Processing and storage capacity already resident on System z can simply be activated and used with little or no disruption to both the BI and transactional processing environments. System z also incorporates tools and techniques. These include unique speciality engines that improve performance, tools for prioritising queries and setting workload goals and thresholds, and online utilities to speed up common database management tasks around database design.

BI must deal with increasingly mixed workloads

BI can be a resource-hungry application – with each query, analysis and report jostling for its share of processing resources. Anticipating BI workload escalation during its development is difficult. Equally, it is difficult to test and fine-tune a BI system for simple, complex or time-sensitive query workloads that are often being run concurrently. The underlying BI platform should be able to efficiently balance their execution across system resources to ensure that response times are being consistently maintained, especially in peak processing periods.

System z has proven itself capable of supporting the heaviest concurrent data transactional workloads and there is no reason why it cannot do the same for mixed BI workloads against a centralised pool of analytic data. System z enables cost-effective deployment of new and mixed application workloads and is very capable of differentiating between critical work and less important queries. For example, simple queries to support daily operations must be quickly executed, BI queries for strategic analysis can often tolerate a slower response, and complex analytical queries can afford an even longer elapsed time before delivering results.

System z can easily be configured to dynamically allocate resources based on business rules and policies (like priority or even user-class), making it well equipped to integrate multiple BI workloads on the same server and swap in/out unused processing cycles between BI applications to maximise capacity utilisation. System z can also run different BI applications and workloads within 'logical partitions' (virtual slices of hardware, processor, memory and I/O connection resources) allowing it to mimic some of the desirable features of server arrays or bladed server systems such as the ability to dedicate specific hardware to specific tasks or workloads. System z also offers speciality processors – called zIIP (z Integrated Information Processor) and zAAP (z Application Assist Processor) – that redirect parallel query processing, which is commonplace in BI, to dedicated utility processors that target capacity to specific workloads. These speciality high-speed engines help to reduce overall processing costs when BI data is centralised, reducing the administrative overheads needed to string queries in parallel across server nodes.

BI needs to be fed by trusted information

A critical success factor of any BI project is the confidence level attributed to the data underlying the system. Issues such as poor data quality, fragmentation, data decay and multiple sources of the 'truth' can drastically reduce user trust of BI data and lessen the decision-making capabilities of an organisation. Building BI of a solid data management foundation is essential to ensuring access to clean, consistent, timely and complete data. However, data integration is the trickiest (and costly) part of implementing a BI system, representing approximately 70% of the overall development cost. Much of that comes from a complex and high latency ETL cycle that pulls data from multiple transactional applications across into the BI environment.

Running the BI system directly on System z simplifies much of the complexity and hard graft needed to move and integrate fragmented data across two different platforms by co-locating all the data in a single platform. This co-location breaks down the walls that have traditionally existed between transactional data stores and BI by minimising the need to offload data to another platform and maintain duplicate copies of data across separate database servers. That takes time, extra resources and introduces a degree of latency. Since so much data is already housed on System z, it makes more sense to integrate the data on that platform rather than port the data to a distributed network. Accessing data where it lives (i.e. on the mainframe) also helps to deliver a "single version of the truth" of corporate data. Reducing the need to manage disparate data across applications and databases ensures that all BI tools and applications are accessing a single trusted source of information that is critical for enterprise-wide BI deployments.

However, there will invariably be a need to integrate non-mainframe data into the BI system to get a complete 360-degree view of the business. System z and third-party data integration vendors now provide robust and sophisticated data integration and data quality technologies that support both batch and near-realtime BI and analytic processes. For example, IBM's Information Server offers data federation capabilities that consolidate data sourced from multiple views into a single view on System z.

BI needs to be manageable and secure

Large BI environments can be complex and difficult to maintain, administer and manage, an activity that accounts for a big chunk of its overall TCO. As BI user communities expand within and across different departments in the enterprise a BI system tends to include more types of data, applications and tools. Companies must be able to control and manage this environment in terms of hardware and software components. At the same time BI systems handle extremely sensitive business data. Hence providing water-tight security and granular access controls to that information is paramount to prevent unauthorised access and intrusions both internally or externally.

Both can be challenging tasks, especially in daisy-chained Unix and Windows server farms that have sprawled out of control. System z on the other hand provides IT staff with centralised point of management and control for administering a BI environment. That means when the BI system hiccups it is much easier to trace and fix problems. System z has also paid much greater attention to simplifying its management interfaces and consoles, updating them with modern wizard-driven interfaces and dashboards for common BI administration tasks such as user management, systems performance and security monitoring.

System z has a reputation for having an unmatched level of data and end user security – which explains why so many of the world's leading banks and retailers rely on it to secure sensitive business transactions. It is not only naturally easier to secure, from a physical sense (access controls are much easier to implement at a

protected, data centre site than across widely scattered set of server closets) but also has authentication and audit capabilities built into nearly every level of its architecture – from processor up to applications levels – to secure shared access. And because BI data is stored on a centralised server it avoids complexity and security implications of replicating and maintaining duplicate copies of data across a pool of discrete systems. These robust security features help companies to not only secure sensitive BI data but also meet their regulatory compliance and reporting needs.

BI should leverage new and emerging technologies

Technological advancements like virtualisation, SOA web services and Linux are improving the way in which corporate IT systems are being built and deployed. BI can also benefit from these advancements and it is imperative that mainframe platforms interface with these new and emerging technologies.

Virtualisation is a no-brainer for System z – mainframes have been doing virtualisation successfully for more than 40 years and arguably better than distributed server vendors are trying to do nowadays. Virtualization can cost-effectively link 'legacy' mainframes with users, resulting in better interoperability at lower costs. System z is also a fully SOA-aware platform supporting interoperability standards such as XML, WSDL and SOAP. That is especially important as corporate IT increasingly shifts towards SOA and access to data becomes services-based.

Many companies are looking seriously at Linux as a strategic platform for running their enterprise applications on. In fact Linux on x86 is one of the fastest-growing operating systems for new BI deployments. It is also becoming popular in mainframe environments – 25% of all new System z investment is consumed by Linux. System z has now embraced Linux and re-tooled itself accordingly. The platform now comes with a speciality processor called IFL (Integrated Facility for Linux) that allows users to run BI applications. And because Linux is free and well known to young IT staffers, it can dramatically reduce development costs and provide an ample source of BI systems management skills.

Although many BI and analytic software vendors are still playing catch-up to develop tools and applications for System z, some are already offering Linux versions of their software that run on System z and which are zIIP eligible. As the range of software running on System z broadens, companies will be able to match more proven BI reporting and analysis, advanced analytics and data mining capabilities to the power and reliability of System z.

The bottom line

An ideal candidate for running on mainframe systems

With BI now being viewed as a business necessity that is becoming pervasive across the enterprise, we believe it is time for organisations to consider the advantages of putting BI on a powerful industrial-strength platform like the mainframe. BI certainly works in a distributed client-server environment. But the inherent strengths of the latest class of low-maintenance mainframes, like System z, surpass many distributed platforms, offering significant advantages that enhance BI by making it less expensive to run, more scalable, less complex to administer, more secure and most important of all less redundant.

Many organisations are also keen to get more bang for their BI and mainframe buck, driving towards leaner BI practices and enhancing the value of their System z investments. Consolidating BI tools and applications onto a single powerful platform allows them to standardise their BI environment and cost-effectively extend BI capabilities to a broader population of users at all levels of the enterprise. At the same time adding a key business initiative like BI can significantly enhance the role of System z in the corporate IT infrastructure.

By pairing the right software provider with the right mainframe provider BI can be successful as well as more economical and appropriate for any organisation that is looking to transition their BI implementation from a strategic back-office function to an enterprise-wide application.
