Optimizing Mainframe Performance
for Digital Business Workloads

IN THIS WHITE PAPER

This IDC White Paper examines the impact digital business workloads and transactions are having on mainframe performance and availability. The role of the mainframe in supporting and optimizing digital business applications is discussed, and requirements for mainframe performance optimization to meet digital demands are examined. This paper also discusses how BMC Software's MainView can help business organizations and enterprises achieve and sustain mainframe performance and availability levels needed for digital business workloads.

INTRODUCTION

Today's business environments are increasingly being driven by a rapidly developing variety of digital technologies. Mainframes, long the backbone of business transactions and data, play a key role. Digital technologies are transforming the ways in which organizations of all types conduct business and interact with their customers. Digital technologies are being used to achieve efficiencies and enhance the user experience in many ways:

- Connect users directly to digital applications with self-service
- Define and implement end-user digital interfaces
- Provide personalized services
- Streamline and automate business processes
- Support massive transaction volumes and scale

Key digital technologies include mobile devices, social business, big data and analytics, and public/private/hybrid clouds. Digital business applications can utilize these technologies to provide widespread access, high availability, rapid performance, business efficiency, and competitive advantage.

THE MAINFRAME'S ROLE IN DIGITAL BUSINESS

Mainframes play a key role in digital business. Many digital applications are based on mobile or handheld device access to data stored on the mainframe. Business, commercial, and user data can be critically important components for use in digital applications. For example, highly sensitive banking, credit card, mobile payments, and other financial and consumer data is typically stored in mainframe databases because of the mainframe's availability, reliability, security, and scalability, including high performance for transaction processing.

Consumers expect personalized services, and mainframe databases often have the critical information that is needed to deliver these services. Typical scenarios include ecommerce and ebanking applications where the digital user interface and user access are provided on a mobile device such as a tablet or a smartphone and the application accesses data stored in a mainframe database such as IMS or DB2. Access to mainframe data may be through a transaction processing system such as CICS – often with a graphical user interface (GUI) or Web-based or mobile device front end – that gives users a consumer-like experience for connecting to a digital business application.

Digital Business Drives Mainframe Performance Needs

The drive to embrace the digital economy is placing new performance demands on the mainframe. Mobile users expect consumer-like responsiveness and 24 x 7 availability for digital business applications. Consumers visiting ecommerce shopping sites demand instantaneous response times and instantaneous data retrieval. Slow response times may cause consumers to abandon shopping transactions or switch to alternative sources. Real-time fast performance is a must.

Mobile users are driving up transaction volumes, often with bursts of peak traffic or spikes at unpredictable times. Mobile transactions may peak at times outside normal work patterns and may consist of larger, more complex content. These new usage patterns can cause unprecedented performance problems as usage spikes. Mainframe monitoring and management are more important than ever to ensure availability and increased performance and to avoid disruption of digital business applications.

Often, the increase in transaction volumes can consist largely of nonrevenue-generating interactions. Consumers are frequently checking account balances, getting alerts, comparing prices, and exploring options such as travel schedules, shipping status, and hotel availability, without generating any new revenue. This increase in transaction volumes is putting pressure on IT for efficient monitoring solutions that help improve performance and support cost control as key business requirements.

Providing effective end-user access to mainframe data is often enabled by digital business applications that can span multiple mainframe subsystems. These subsystem components can be the source of bottlenecks, slowdowns, and even outages, especially under heavy loads. Optimizing performance for end users requires that the individual subsystems underlying digital business transactions be tracked and managed to meet service objectives.

Another growing area of digital performance management is optimizing Java on the mainframe. Java is being used to quickly develop and deploy new applications to meet dynamically changing digital business needs and take advantage of widely available programming skills. This is being done to develop applications faster and more economically. However, Java manages its own resources – often consuming large amounts of memory and processor time – and can cause performance problems if not managed with an integrated monitoring solution on the z/OS platform.

Optimizing Digital Applications — Mainframe Monitoring

IT organizations must be able to satisfy "digital age" expectations for performance and availability to support business needs – especially as they are perceived by end users. To do this, IT organizations must be able to monitor performance across a wide range of mainframe infrastructure components and subsystems to be able to identify impending problems and take quick actions to

prevent slowdowns or outages before they can impact users. Key capabilities for mainframe monitoring include the following:

- Measure ongoing usage metrics across z/OS and subsystems
- Provide consolidated systemwide views with easy drilldown to isolate problems quickly
- Report on performance measures and infrastructure utilization
- Track workload and transaction performance against thresholds
- Detect exceptional conditions and generate alerts
- Provide intelligent automation for proactive problem resolution
- Integrate data from multiple sources – system, subsystem, and application
- Visualize through customizable dashboards and graphical displays

These core functional capabilities provide the foundation for monitoring z/OS environments. The monitoring functions must be fast and efficient and be able to identify and help resolve problems quickly in order to satisfy performance and availability needs for digital business applications and workloads.

MAINFRAME PERFORMANCE MONITORING: BEST PRACTICES

Core monitoring functions are essential to tracking and optimizing mainframe performance. Meeting the monitoring requirements for digital business performance on the mainframe can be accelerated by adopting a number of best practices. Beyond functionality, best practices speed agility, efficiency, and ease of operation essential to providing a differentiated performance management solution. The best practices that address key elements and processes for effective z/OS performance management include:

- **Dynamic thresholds.** Traditional mainframe workloads are typically quite stable in terms of their operational usage patterns. This makes it relatively straightforward for IT operations to manually set static thresholds for performance monitoring metrics. However, the characteristics of digital business applications can be highly variable by time of day, day of week, month, and so forth. Monitoring solutions that support "machine learning" of "normal" workload behavior to dynamically set thresholds based on actual usage patterns greatly reduce the time and cost of setting and maintaining thresholds for digital business workloads.

- **Intelligent alerting.** Exceptional conditions can occur in many forms. Some conditions come from unusual usage patterns such as spikes in digital user transactions, whereas others may come from application issues such as excessive use of compute time that causes performance bottlenecks. Simple alerting systems can often generate "event storms" because the same exceptional conditions are detected and communicated multiple times. Intelligent alerting solutions can analyze incoming event patterns and greatly reduce the frequency and number of alerts that are generated.

- **Automated responses.** Fast problem detection and proactive resolution are essential for providing a competitive digital experience for end users. Manual responses to alert conditions can often be slow and costly. Monitoring solutions that can support automated responses to specific types of alerts or error conditions can greatly speed and streamline problem resolution, resulting in better performance and availability.

- **Simplified operations.** Mainframe operations can pose a challenging environment for IT staff in terms of both staff skill sets and the amount of time needed to perform problem identification, diagnosis, and resolution. A best practice is to provide a simplified monitoring operational environment based on integration of monitoring across z/OS LPARs and subsystems and a common GUI. A top-level view, with drilldowns into specific components to visualize resource consumption and identify potential bottlenecks, is recommended.
- **Minimized operational costs.** Monitoring functions consume mainframe resources, particularly compute time and memory. Monitoring software should be designed to minimize operational costs by such actions as achieving smaller footprints and utilizing specialty processors.

In summary, digital business demands require quick detection and resolution of performance problems before end users are impacted. Best practices can accelerate and simplify the monitoring and related processes needed to achieve these goals. Dynamic thresholds, intelligent alerting, automated responses, simplified operations, and minimized operational costs are key best practices to support the speed, scale, and complexity of digital business workloads.

CONSIDERING BMC'S MAINVIEW

BMC Software's MainView is a comprehensive solution for monitoring z/OS mainframe environments such as IMS, CICS DB2, and Java subsystems. MainView is a long-standing product that has grown and evolved over a number of years. The solution supports monitoring and reporting of measurement data together with analysis capabilities. Automation capabilities can be used to proactively detect and resolve performance issues before they impact users.

According to BMC Software company information, key features and functions of MainView include the following:

- **Real-time and historical monitoring.** Performance metrics can be gathered with BMC's own CMF monitor or from other compatible solutions. BMC's MainView provides facilities to monitor, track, and report key real-time metrics across processes and systems. Metrics include CPs, storage, and coupling facilities. Performance data can be stored for historical analysis and trending.
- **Dynamic thresholding.** Dynamic thresholding is a method of machine learning of "normal" behavior during operational time periods; it is used to set thresholds based on performance history and ongoing trends.
- **Proactive monitoring.** MainView helps IT organizations identify developing performance issues and abnormal behavior and take corrective actions before users are impacted.
- **Performance management.** Integrated interface supports changes to z/OS services, resources, and workloads.
- **Efficient use of resources.** MainView can exploit zIIP specialty processors to greatly reduce the amount of expensive CP time needed for monitoring – by as much as 50%.
- **Centralized architecture.** Data is collected only once and is available to all modules.
- **Single system image.** The entire monitored environment is managed from one graphical console.
- **Automatic actions.** MainView helps IT organizations identify and take corrective actions for abnormal behavior such as exceeding thresholds or job looping. Smart alarms reduce the frequency of alerts sent to operations and can distinguish temporary spikes from more pervasive peak load occurrences.

Based on these capabilities, BMC Software's MainView can support IT organizations in optimizing mainframe performance and availability to meet the requirements of digital business workloads.

User Experience

Real-Time Insurance Access Requires Proactive Monitoring

A Midwest-based insurance company has a legally mandated requirement to verify driver insurance information in real time to assist law enforcement officers during traffic stops. This digital application requires rapid Web-based access to mainframe-based insurance policy data stored in VSAM files. Access is through CICS services front ended by Java. Other key company applications are insurance policy processing services and HR programs, some of which utilize data stored in DB2.

According to the company's CICS administrator, monitoring of key performance and utilization metrics is an important requirement to ensure that service requirements such as rapid response times and high availability are being achieved. Proactive monitoring across a variety of metrics is essential to achieve these service requirements. Monitors must be able to detect exceptional conditions, generate alerts, and send information directly to operations staff on mobile devices. Automation is important to help simplify operations and generate automatic corrective actions for selected exceptional conditions.

The insurance company is using BMC's MainView as its mainframe monitoring solution. Key benefits include MainView's support for monitoring a large number of conditions and metrics, the ability to send alerts directly to operators through cell phone calls, and the ability to automate responses. Currently, over 100 performance measures are being tracked using MainView. BMC's MainView automation is being used to "kill" runaway or looping CICS transactions without operator intervention. This is particularly important for third-shift operations to help ensure availability for offshore developers in different time zones.

CHALLENGES/OPPORTUNITIES

Digital business demands will only grow larger in the future. Business success in this highly competitive environment requires continuous availability, security, and fast performance — all characteristics of the mainframe. A major challenge is to ensure these characteristics continue as workloads grow, transaction volumes increase, and transaction content becomes richer, resulting in larger transactions.

This will require monitoring solutions that can adapt to the increased scale and complexity without developing performance issues or becoming bottlenecks themselves. To meet the challenge of digital business scale, monitoring solutions must be lightweight in terms of resource consumption, fast to identify and alert on exceptional conditions and support automation to reduce the level of manual operation, and respond quickly to resolve common incidents as volumes grow.

Monitoring costs must be kept minimal — even at high volumes — to help justify the mainframe as a strategic platform for digital business. As a further consideration, declining availability of mainframe skills will continue to grow in importance. The challenge for monitoring solutions is to move away from any "green screen" requirements and support modern graphical user interfaces with simplified navigation as the standard operating interface.

SUMMARY AND CONCLUSION

Monitoring is a fundamental requirement for achieving performance and availability management of mainframe systems and is becoming ever more important as digital workloads grow. Successful mainframe monitoring comes from a combination of core functions, simplicity of operation, and implementation of best practices. BMC's MainView monitoring solution provides a rich variety of functions and capabilities that have made it successful in mainframe software markets and is well positioned to meet the ongoing challenges of digital business workloads.

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Global Headquarters

5 Speen Street
Framingham, MA 01701
USA
508.872.8200
Twitter: @IDC
idc-community.com
www.idc.com