

How Can Machine Learning Help You Reduce Operations Costs and Improve Mainframe Performance?

CA Mainframe Operations Intelligence is an integrated solution that combines embedded analytics and machine learning to help you proactively prevent enterprise performance issues and remediate problems faster—resulting in an improved customer experience, increased ops efficiency and reduced overall IT costs.

Executive Summary

Challenge

In the digital economy, it's more important than ever for businesses to harness data to drive competitive differentiation. The growing use of data analytics and always-on mobility is increasing the pressure on IT to provide increased scalability and continuous availability of mission essential services and infrastructure. Traditional reactive approaches to performance management will not be able to keep up with the velocity of change and dramatic growth in today's enterprise datacenters.

Opportunity

Digital innovators are harnessing the trusted attributes of the mainframe as an enabler of digital transformation. To support growth brought on by mobile and data analytics, CA Technologies is embedding operational intelligence into your mainframe environment using data science algorithms that iteratively learn from historical patterns—helping you find hidden insights within your performance data to more proactively predict when systems are behaving abnormally and quickly take corrective action to increase efficiency and deliver an outstanding customer experience.

Benefits

CA Mainframe Operations Intelligence is designed to proactively predict performance issues sooner and dynamically remediate problems before they impact the business. Collaborate more efficiently to isolate root causes faster with centralized insights from multiple data sources. This proactive machine-learning approach can enable you to reduce false positive alerts, avoid lengthy “war room” sessions and increase efficiency across your entire ops team to help address pending mainframe skills gaps and drive down costs.

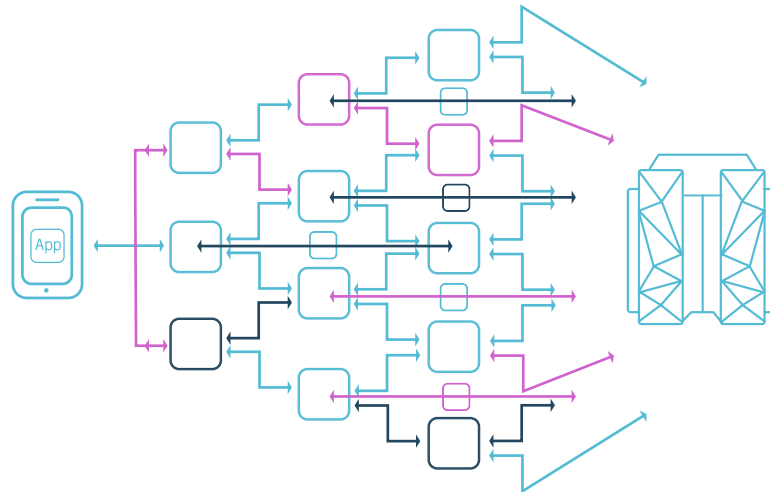
Section 1: The Challenge

Mainframe is Essential to Digital Business Innovation

Digital transformation and the rapid extension of enterprise apps to mobile devices is driving exponential growth in the volume of mainframe system data and transactions. A single mobile transaction triggers a cascade of events across computing systems, generating potentially hundreds of additional system interactions including data encryption and decryption, bank-to-bank reconciliations, customer loyalty discounts, and purchase history comparisons. This cascade of events, sometimes called the “starburst effect,” is increasing mainframe MIPS and also creating potential security vulnerabilities at each interaction point. Traditional approaches to mainframe performance management are reactive and human resource intensive, making it difficult for organizations to keep up with this growth and velocity of change.

Figure A.

One mobile transaction can create infinite system interactions.



Scale and value. Many organizations are experiencing these increases in data, transaction and MIPS on their mainframes without the equivalent increases in staff or budget, requiring the need to do more with less. IT organizations need the ability to scale and provide high availability to support their most critical systems that drive business growth, while maximizing efficiency and managing costs.

Business agility. Due to the growing complexity of applications in the digital world, when production issues occur it can be difficult to pinpoint the root cause of the problem. Delayed access to system data and inability to efficiently communicate often leads to finger pointing, frequent and lengthy war room calls, and unnecessary escalations—costing time and money.

Skills continuity. With its high availability and performance, the mainframe plays an essential role in digital business innovation. But a key challenge facing the mainframe industry is that the majority of experienced mainframe technicians are rapidly approaching retirement and the new generation of IT specialists do not possess the skills to fill the resource gap. New automated solutions and approaches are needed to simplify mainframe management, increase IT operations team efficiency and more quickly on board new IT resources to support mainframe operations more quickly.

55% of enterprise apps need the mainframe.¹

Section 2: The Opportunity

Bringing Machine-Learning to the Mainframe

Today, customer experience is paramount to business survival. And more than simply working, that experience must delight.

Digital innovators understand this and are harnessing the scalability and high availability of the mainframe to meet the challenges of the application economy. Mainframes host mission-essential applications that support thousands of applications and devices simultaneously for thousands of users.

Over the past few years, we've seen the mainframe go through a digital transformation of its own—from being just a revenue-supporting platform, to one that has become a source of revenue growth and innovation.

68% of consumers will abandon app if it doesn't load in at least 6 seconds.²

Adopters of a connected mainframe strategy can achieve more than 300% return on investment (ROI) over five years in their quest for digital transformation.³

Machine-Learning for Intelligent Mainframe Management

With the next machine age upon us, everything is getting smarter and analytics are a part of our everyday experiences. Websites learn our preferences and make real time suggestions, and cars are on the cusp of driving themselves. And as the mainframe continues to become more connected in the enterprise to deliver new mission essential services, it is transforming from a system of record into a hub for systems of intelligence, becoming a platform of choice for machine learning and intelligent automation in the enterprise.

As a recognized leader in z/OS® management and automation, CA brings machine learning to the mainframe with CA Mainframe Operations Intelligence, an integrated mainframe management solution that provides advanced analytics to more proactively prevent performance issues and remediate problems faster. A modern web-based collaboration environment enables easier, faster access to multiple views of mainframe system analytics data to help improve IT ops team efficiency—from novice operations generalists to expert system performance specialists. With operational intelligence embedded into the solution suite, historical data and machine learning are used to set dynamic thresholds that can detect anomalies sooner and predict issues real-time.

Designed for enterprise IT ops teams who demand the absolute best to optimize system performance and efficiency, CA Mainframe Operations Intelligence provides a comprehensive set of integrated capabilities:

System Management

CA SYSVIEW® Performance Management (CA SYSVIEW) provides in-depth monitoring and management of performance across a wide range of mainframe system resources (z/OS, JES, USS, CICS, MQ, IMS, TCP/IP, DB2, CA Datacom® and CA IDMS®). Embedded operational intelligence leverages historical data and real-time machine learning to provide dynamic alerting that more proactively detects performance anomalies. A modern collaboration environment provides logical drill down for faster root cause analysis and remediation to prevent slowdowns or outages before they can impact users. Josef Saller, a z/OS systems programmer at a financial services firm, agrees: “Several times [CA SYSVIEW] saved us tens of thousands of Euros by tremendously reducing the time necessary to solve a severe operating system problem.”⁴

“We replaced BMC MainView with CA SYSVIEW for cost reasons. It integrates very nicely with other products from CA, like CA OPS/MVS, and it’s easy to learn.”⁵

—Tech Analyst at Insurance Company

Operations Management and Automation

CA OPS/MVS® Event Management and Automation (CA OPS/MVS) gives organizations the ability to simplify mainframe management via policy-based automation and the flexibility to implement business-specific processes. The solution is designed to manage the availability of critical z/OS resources and help maintain optimal mainframe system

conditions by managing daily operations according to defined business policies, replacing the need to manually react to console operator messages. CA OPS/MVS proactively monitors and manages started tasks, online applications, subsystems, JES initiators, other z/OS resources including Linux on z Systems.

“Compared to the other products on the market, [CA OPS/MVS] is hands down the best one.”⁶

—Senior Systems Administrator, Transportation Company

Database Management

CA SYSVIEW® Performance Management for DB2 (CA SYSVIEW for DB2) provides real-time performance monitoring of DB2® applications and subsystems, enabling the rapid detection and correction of performance problems. The solution provides a single point for viewing the status of all DB2 subsystems across local and remote z/OS images so you can identify areas for performance improvement and diagnose the causes of DB2 issues.

Network Management

CA NetMaster® Network Management for TCP/IP (CA NetMaster) helps facilitate high-availability and performance of TCP/IP-enabled mainframe applications by automating the management and monitoring of network infrastructures, devices, events and connections. This solution is designed to help you achieve reliable network connectivity by monitoring network health, tuning performance and quickly diagnosing and fixing network issues before they affect business operations. CA NetMaster leverages real time notifications of network security events and secured network connection management to improve overall security awareness.

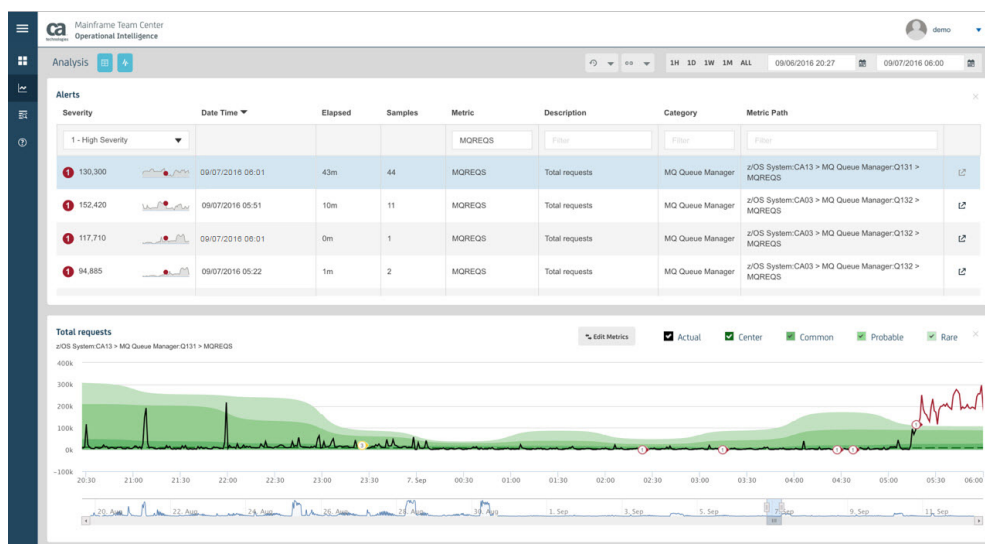
Enterprise Application Performance Monitoring

CA Cross-Enterprise Application Performance Management (CA Cross-Enterprise APM) is designed to provide 24x7 monitoring of business transactions for complex application environments by monitoring the real-time performance of mainframe subsystems. CA Application Performance Management (CA APM) provides customers with a proven solution for managing the customer experience, service level agreements (SLAs) and the business impact of performance issues along with comprehensive diagnostics, triage and root-cause analysis. With mainframe being a key piece of enterprise business services, the correlation of the data from the mainframe to the originating application is paramount to being able to manage the end-to-end application experience.

Machine Learning and Data Science Algorithms

Machine learning is the next big thing, and CA is applying those principles to IT with a significant corporate-wide investment in data science algorithms being implemented across the CA mainframe portfolio and other CA solution areas. CA is bringing machine learning to the mainframe using operational intelligence to iteratively learn from past behavior, to help you find hidden insights within your performance data to more proactively predict when systems are behaving abnormally, and then take corrective action sooner through automation.

Figure B.
Operational intelligence helps reduce false positive noise.



CA Mainframe Operations Intelligence uniquely uses the combination of two key data science algorithms to predict performance problems sooner and more accurately.

The powerful machine-learning approach embedded into CA Mainframe Operations Intelligence uniquely uses the combination of two key algorithms (KDE and EWMA) to provide more optimum and accurate predictive capabilities:

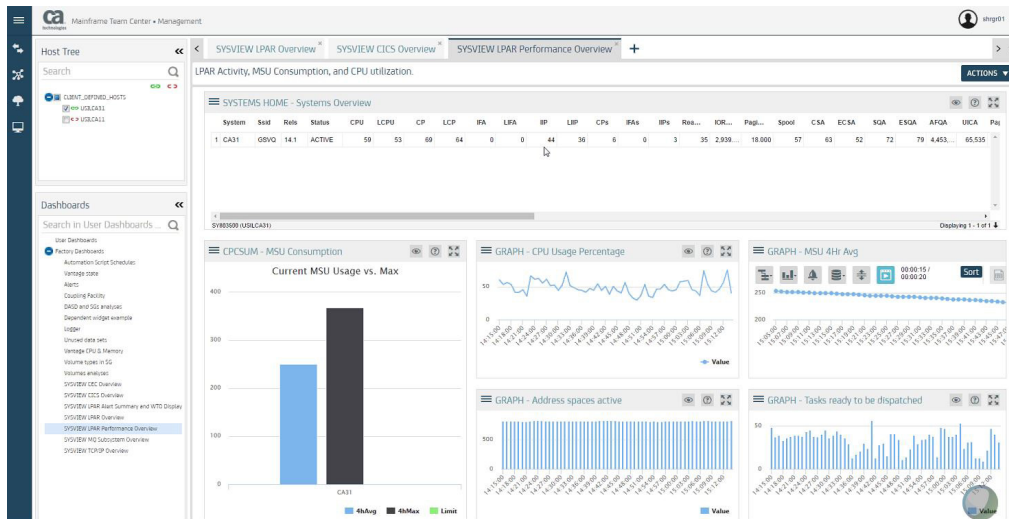
1. Get started right away with Exponentially Weighted Moving Average (EWMA) Algorithm:
 - Allows you to get started Day 1.
 - Compares volatility on multiple time-scales to identify changes in behavior.
 - Produces immediate proactive alerting and significant improvement over the reactive alerting based on dashboards and static threshold methods available today.
 - False positive noise is reduced as more data is consumed.
2. Further refine predictive capabilities with Kernel Density Estimation (KDE) Algorithm:
 - Displayed predictions provide historical context, summarizing typical metric behavior.
 - Leverages historical data to reduce false positives.
 - Predictions are typically produced for metrics in just one week, and predictions improve in robustness as more historical data is consumed. Peak robustness is typically achieved within six weeks.
 - Compares new metric values to previously observed behaviors at the same stage of the business cycle.
 - Dynamically identifies individual extreme values as a simple threshold would, but additionally identifies sequences of values straying from the prediction.

Team-Centric Collaboration Environment

Mainframe Team Center is a modern HTML5 web-based user interface that's integrated across mainframe management solutions to provide easier, faster access to mainframe systems, network, storage and event data. From operations generalists to system performance experts, the interface helps operations teams more efficiently collaborate to triage performance issues, identify root causes and remediate problems.

Figure C.

Mainframe Team Center-Management enables collaboration across teams for faster root-cause analysis.



Easy Installation

With simplicity and flexibility top of mind, the analytics engine was developed as an operations intelligence software appliance using Docker. This makes it easy for you to deploy state of the art analytics technology as part of your existing CA software investment. The operations intelligence appliance can also be easily ported between Linux on z Systems, x86 and cloud, helping reduce overall IT costs.

Additional Integrations Bring Increased Value

CA Mainframe Operations Intelligence also integrates with:

CA Vantage™ Storage Resource Manager, a vendor-neutral storage management solution that helps unify your storage operations for disk and tape resources and media, robotics and virtual tape systems, data encryption and tape management systems. Policy-based automation helps increase your efficiency and productivity to manage your growing storage infrastructure. CA Vantage SRM is also designed to improve utilization of your IBM® z Systems® storage resources to better provide for protection and high-availability of stored business information, while maximizing ROI through cost containment and implementation flexibility.

CA Mainframe Application Tuner, a DevOps solutions that monitors application programs to pinpoint delays. It helps align development output with operations by detecting and analyzing performance issues down to the code, function and database call level. It observes and samples program activity, showing you the application’s view of performance and detailed application-specific delay information, allowing you to improve the performance of your applications. From a single program-monitoring session, CA Mainframe Application Tuner can answer questions for the application programmer, systems programmer, and database administrator. This capability saves time and reduces machine resources that are used in resolving program bottlenecks or delays.

Section 3:

Proactively Prevent Performance Issues and Remediate Faster

CA Mainframe Operations Intelligence is designed for enterprises who demand the absolute best to help optimize system performance and operations efficiency, while also reducing overall IT costs. With advanced analytics and machine learning embedded into your operations, you can:

Predict problems earlier. Advanced analytics detect abnormal patterns of operation sooner so you can proactively take action and prevent problems before the business is impacted.

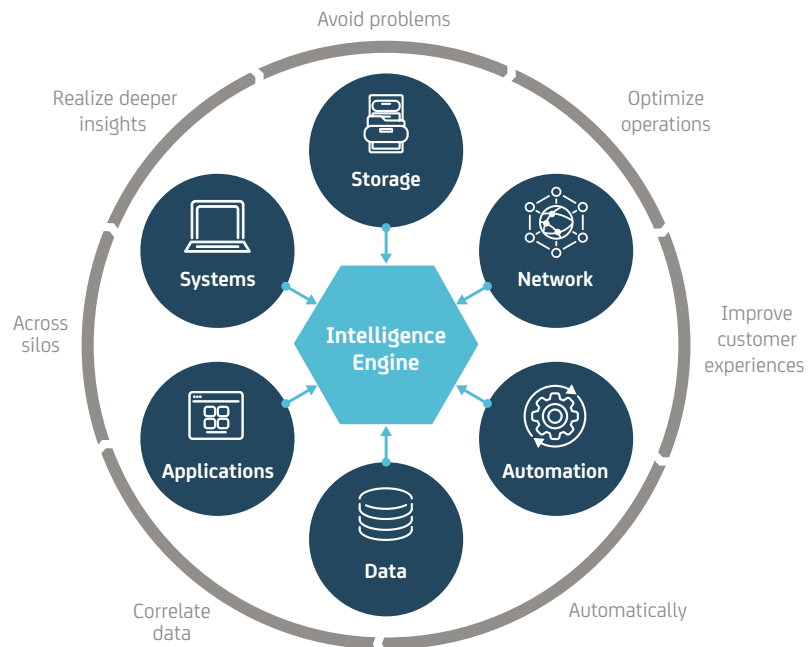
Remediate issues faster. Operational intelligence captures patterns, triggering dynamic alerts so problems can be quickly and reliably handled.

Improve continuously. Operational feedback loops enable the system to learn from actions previously taken for specific patterns, to recommend actions the next time that pattern occurs. By apply data-science algorithms, machine learning can also help reduce false positive alerts, preventing lengthy “war room” sessions and increasing efficiency of your entire ops team.

Collaborate efficiently. Modernized team-centric UX provides collective view of information from multiple sources, helping everybody from novice operation generalists to seasoned system experts work together to quickly isolate the root cause of a problem.

Figure D.

When something goes wrong, you have one place to look.



“Our teams can prevent costly downtime and remediate problems faster when they do occur by taking advantage of advanced analytics, embedded intelligence and modernized user interfaces designed for better collaboration.”

—Pavel Kanak, Tieto, Technical Architect, Mainframe Automation

The traditionally trusted strengths of the mainframe, such as speed, security and high availability—combined with new machine-learning capabilities and increased connectivity—continue to put the mainframe at the center of the next digital business innovation.

As organizations evolve toward the “connected mainframe,” the platform is at an inflection point where it is not just supporting revenue transactions, but also being used to drive top line revenue growth and innovation. The breadth and depth of the CA portfolio supports key steps—including modernization, integration and machine-learning initiatives—in achieving the connected mainframe and sparking new business innovations that help drive revenue growth and improve operational efficiency.

Section 4:

The CA Technologies Advantage

CA Technologies (NASDAQ: CA) provides IT management solutions that help customers manage and secure complex IT environments to support agile business services. Organizations leverage CA Technologies software and SaaS solutions to accelerate innovation, transform infrastructure and secure data and identities, from the mainframe to the cloud. CA Technologies is committed to ensuring our customers achieve their desired outcomes and expected business value through the use of our technology. For more information about CA Technologies go to ca.com.

To learn more about CA Mainframe Operations Intelligence, visit ca.com/intelligent-mainframe.



Connect with CA Technologies at ca.com



CA Technologies (NASDAQ: CA) creates software that fuels transformation for companies and enables them to seize the opportunities of the application economy. Software is at the heart of every business, in every industry. From planning to development to management and security, CA is working with companies worldwide to change the way we live, transact and communicate—across mobile, private and public cloud, distributed and mainframe environments. Learn more at ca.com.

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- 2 Brandy Shaul, adweek.com, "Study: Consumers will Abandon Apps with Greater Than Six Second Load Times," March 4, 2015
- 3 Peter Rutten, Matthew Marden, IDC, "The Business Value of the Connected Mainframe for Digital Transformation," December 2016
- 4 IT Central Station, [CA SYSVIEW Review](#), Dec 26, 2016
- 5 IT Central Station, [CA SYSVIEW Review](#), Dec 14, 2016
- 6 IT Central Station, [CA OPS/MVS Event Management And Automation Review](#), Jan 4, 2017

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