IBM SmartCloud Application Performance Management







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In today's economic environment, clients are telling us they face three key demands:

Higher service expectations

- Improve efficiencies across the business
- Respond to new opportunities quickly

Rising cost pressures

- Shorten ROI, lower costs
- Add value now

Ever-increasing complexity

- New technologies, new opportunities
- Faster rate of change



...while acting with a sense of speed and urgency.

Businesses are facing unparalleled challenges

- Accelerated rate of change drives the need for increased visibility into the application & IT infrastructure
- Monitoring IT resources alone provides an incomplete view of application performance and makes problem isolation and resolution a complex, expensive task
- Lack of visibility into end-user experience, component relationships and service levels in dynamic environments such as cloud
- Performance and availability issues for multi-platform composite applications
- Lack of drilldown capability to find the root cause of problems
- Increased risk of revenue loss and brand damage



Application Performance Monitoring (APM)

Gartner defines application performance monitoring (APM) as one or more software and hardware components that facilitate monitoring to meet five main functional dimensions: enduser experience monitoring (EUM), runtime application architecture discovery modeling and display, user-defined transaction profiling. component deep-dive monitoring in application context, and analytics.

Application Performance Management provides the actionable insights required to optimize performance, manage risk, and reduce costs in your application environment



Capitalware's MQ Technical Conference v2.0.1.4

Benefits to Effective Application Performance Management

- Ensure <u>application response</u> meets business expectations
- Understand transaction flows over complex topologies
- Drive <u>close collaboration</u> between departments
- Monitor infrastructure performance and availability
- <u>Diagnose</u> application performance issues
- Increase application availability and <u>customer satisfaction</u>



Application Performance Management Workflow



The Issue – Sensing and Isolating a Problem Today



Money wasted isolating problems

Sev 1 outages/slowdowns per year	12
Average time to isolate (hrs)	8
SME's involved in isolation	15
Avg. loaded hourly rate (/hr)	\$75
Total direct costs	\$1 08,000

Revenue lost during outages

Lost revenue per hour	\$50,000
Hours downtime / yr	96
Total indirect costs	\$4,800,000

Total costs of poor problem isolation capability	
Total lost / yr	\$4,908,000

Every customer case will be different ...

...what do you lose each year due to poor performance?

End-to-End Monitoring, Tracking and Diagnosis



Transaction Root Cause Analysis								
1. Sense End User Experience and alert on threshold violation	1. Isolate by measuring performance data against baseline through entire infrastructure	1. Diagnose and repair through launch-in-context into deep-dive diagnostics						

End-to-End infrastructure - System z backend



The front-end may be either zLinux, distributed or native z/OS or a mix: customers may deploy any of these configurations.

ITCAM for Transactions Focused on simplicity and integration

Response Time Measurement

Monitors transaction performance and identifies end-user problems



Transaction Tracking

Consumes data from app server, MQ, CICS, IMS and custom instrumentation to show topology and isolate problems

Deep dive Analysis

Supports launch in context to SME capabilities including SME level tracking

End User Monitoring

Ensure end user's experience always meets their expectations

- See what your users are experiencing
- Identify problems before they affect SLAs:
 - Real-User monitoring
 - Robotics monitoring
- Continuously validate production system performance
 - Captures performance and availability data of actual users for SLA reporting
 - Monitors network traffic for HTTP(S) requests to the web server
 - Completely non-invasive, agentless monitoring
- If you have a problem, find out about it <u>before</u> the customers complain





50% of problems found through

Web Applications -Agentless

- Captures performance and availability data of actual users for SLA reporting
- Completely noninvasive, agentless monitoring
- Monitors network traffic for HTTP(S) requests to the web server



Monitor every end user's experience

- See what your users are experiencing and immediately identify problems
- Agentless no impact to production machines
- User/session tracking observe individual user experience
- Multi-protocol support (beyond HTTP/S)

Service Tree						1. 2		
	State	Percent Available	Failed Requests	Percent Slow	Response Time	Total Reques		
E 🚸 062		0.0%	5	0.0%	0.222 sec	5		
🗄 🤣 Google		100.0%	0	0.0%	3.037 sec	1		
н 🛷 16м		100.0%	0	100.0%	2			
🗄 🥎 15M Webserving Pluphere	4	100.0%	0	27.272%	0.0010 sec	11		
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- Verification Points for content matching and response code checking
- HTTP transactions correlate with downstream instrumentation for problem isolation
- Improved scalability for more concurrent playbacks on a single agent
- Support for a growing list of protocols: HTTP(S), Siebel, Citrix, web services



Transaction Tracking

Quickly isolate the failing component in the application

- Follow path of user transactions across application infrastructure domains, making it easier to evaluate a transaction in its entirety
 - Agentless: Track flows through network traffic
 - Agent Based: Detailed, Instance-level Transaction Tracking
- Visibility into how IT infrastructure delivers business critical applications
- End-to-End view of response times across multiple domains helps quickly isolate problems and hand problem off to appropriate specialist



Problem Isolation Through Transaction Tracking

- Unified, end-to-end transaction tracking
- Heterogeneous environments
 - fully integrated across distributed and System z



- Support for asynchronous transactions
- Extensible, modular framework
- Integrated response time and transaction tracking

Agentless Transaction Tracking



Enterprise-Wide Tracking

- Track inside domains with correlated techniques
- Track between domains through stitching



Transaction Tracking Topology



ITCAM for Transactions – Topology Workspace Views

- There are 4 topology workspace views available in the TEP.
 - Server:
 - A topology showing monitored servers (Sysplex name/SMFID or shortname).
 - Component
 - A topology showing the monitored components (Eg: WAS, CTG, CICS, IMS, Connect IMS, WMQ).
 - Application:
 - A topology showing monitored applications (jobnames, STC names, subsystem names).
 - Transactions
 - A topology showing the monitored transactions (Eg: CICS transaction name, IMS transaction name, WAS jsp).



Simple server topology shows single distributed server interacting with a single z/OS server.



Component view provides more insight into the deployment. On z/OS, WMQ into CICS (via the bridge) with a typical CICS to DB2 backend. A z/OS monoplex was chosen for simplicity.



The application topology view shows WMQ Queue Manager, CICS STC, and the DB2 subsystem.

Mouse over shows z/OS host system and response time details. In a sysplex (shown later) we can use this view to locate a specific

WMQ/CICS/DB2 on the associated sysplex member.

Transaction topology



Transaction topology – Launch to Omegamon for DB2



Right-click on the DB2 icon enables launch to Omegamon for DB2



4-Way Sysplex – System Topology



4-Way Sysplex – Application Topology



The topology looks complex but can be divided into segments (each z/OS in the sysplex) to gain clarity.

4-Way Sysplex – Transaction Topology



4-Way Sysplex WMQ \rightarrow CICS \rightarrow DB2



4-Way Sysplex WMQ \rightarrow CICS \rightarrow DB2



Diagnostics

Quickly identify the source of the failure within the component

- When the failing component has been isolated, detailed performance and availability metrics provided to SME to troubleshoot
 - Access to both Real-time and Historical data within a single UI
- Access to key performance metrics for each resource to quickly identify source of failure
- Expert Help and Best Practice guidance for optimum performance



Analytics Opportunities in IT Management

Performance and Capacity Track, Optimize, and Predict Capacity and Performance needs over time	Outage Avoidance Ensure Availability of Applications and Services	Faster Problem Isolation Find the Critical Data Faster with systems designed for no-touch escalation and highlighting	Customer Insight & Care Reduce Customer Frustration by spotting their frustrations before they call (or leave)
 Knowledge Track Capacity and Performance of Applications and Services in Classic and Cloud Environments Optimize Resource Deployment with what-if and best fit planning tools Escalate Capacity and Performance problems before they cause critical failures 	 Better Insight • Use Learning tools to augment custom Best Practices • Leverage Statistical methods to maximize predictive warning • Improve Problem detection across IT Silos 	 Find Critical Data I dentify problems quicker with insight to large unstructured repositories Isolate problems quicker by bringing relevant unstructured data into problem investigations Repair problems quicker with the right details quickly to hand. 	 Pain Points Gain insight into what is important to your customer Decrease customer churn and acquisition costs Increase customer retention and satisfaction

Implementation of Analytics Solutions lowers IT Administration Costs:

- Performance and Capacity planning tools monitor appropriately and escalate, reducing time consuming report browsing
- Learning tools reduce customization and best practices investment on initial deployment
- Workload Analytics helps speed problem resolution

Faster Problem Isolation

Find the Critical Data Faster with systems designed for no-touch escalation and highlighting

Find Critical Data

• **Identify** problems quicker with insight to large unstructured repositories

• **Isolate** problems quicker by bringing relevant unstructured data into problem investigations

• **Repair** problems quicker with the right details quickly to hand.

Keep critical un-structured data (such as log files) at your fingertips

- Use Big Data techniques to process huge amounts of data fast enough for it to matter Operationally
- Search, Index, Federate: data at your fingertips without single-point consolidation
- Best Practice problem escalation with pattern-based searching, triggering alerts from relevant log patterns
- Extensible, automatically updating pattern library to speed solution evolution
- Get the last critical piece of data for identifying, isolating, and correcting problems faster.

Log Analytics for Problem Isolation & Root Cause Analysis

Combine Traditional Monitoring Data with Log File Search Results

- Use Pattern matching techniques to search and analyzes all of relevant data
 - · Raise an alert when dangerous patterns of behavior are noted
- Capture information about all unstructured information
 - Put the one piece of data required to solve that big problem at the fingertips of your SMEs.
- Bring together metrics, log entries and expert advice to help solve problems.
- Integrate this data through Analytics solutions to learn and discern patterns, escalate problems, and relate log data to discovered issues for faster resolution

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Analytics for System z addresses predict, search and optimize requirements on impact from new technology

• Much greater amount of critical IT operational data (SMF, log, journal) than distributed-only environments.

- Focus on problem determination and time to resolution while placing premium on availability of services and applications.
- By 2016, 20% of Global 2000 enterprises will have IT operations analytics architecture in place, up from < 1% today, looking to integrate across their enterprise to reduce outages (Gartner).
- 90% of the Fortune 1000 companies are running z and have 'Systems of Record' dependencies for transactional processing and data serving applications .



IBM focused on managing end-to-end analytics for Big Data and applications across all platforms



Gain Cloud Insights

Predict:

- Pro-Active Outage Avoidance
- Predict Problems before occurrence

Search:

- Quickly analysis large volume of log data
- Match Log-files with alerts and metrics

Optimize:

• Improve Performance across IT Infrastructure



Handle increased mobile workloads on z with improved data analytics for find and fix problems faster.

Performance Data



Avoid Outages and service degradation through early detection of abnormalities

Improve insight though the analytical discover of metric relationships and trends

Reduce root cause analysis by reducing time to isolate faulty components in complex infrastructure

Unstructured Data



Identify problems quicker with insight to large unstructured repositories

Isolate problems quicker by bringing relevant unstructured data into problem investigations

Repair problems quicker with the right details quickly to hand.

ibm.com/it-operations-analytics

Search for and rapidly analyze unstructured data to assist in problem identification, isolation and repair



Faster Problem Identification and Isolation

- Search and indexing of logs and data
- Cross domain analysis

Faster Problem Repair

• Linking expert knowledge to log error/warning messages

Challenges

- No warnings before outages
- Reactive application resets to restore service.
- Root cause of outages unknown

Search

IBM Cloud Analytics -Log Analysis z/OS Insight Packs

Results

Internet Banking

Up to 3 day advance warning of outages, 10 major incidents in 4 weeks. Savings of \$600K.

Communications Company

\$300K of cost avoidance annually.

Traditional Banking

Outages reduced by 70%-80% due to problem isolation

Predictive Insights (PI) Analytics reports on events and anomalies that could cause future problems

Using SmartCloud Analytics – Predictive Insights



Operations teams can now focus more on prevention!

NOT ENOUGH TIME TO PREVENT FAILURE

 Predictive Insights can consume data from distributed and mainframe systems

Predictive Analysis with IBM zAware – Log Analytics on System z using Anomaly Detection

- Save money by ensuring z/OS availability (decrease time to perform problem determination and lower Mean time to Repair)
- Problem isolation and management (NetView/OMEGAMON) and event visibility (OMNIbus)



Optimize Big Data and Cloud workloads to create knowledge for better business and IT planning

Capacity Management Analytics (CMA) solution

- Analytics, monitoring and management across Big Data on System z environment including CICS, DB2, IMS, WAS
 - Operations Insights with TDSz, SPSS and Cognos
- Focuses on data related to System and Workload Characteristics, Performance and Trending
- Provides recommendation to optimize Systems and Workloads based on Predictions and Forecasting





Capacity Management Analytics supports key customer requirements for improved business agility

- System/Workload Characteristics, Performance and Trending
 - What's driving demand?
 - Capacity constraints causing bottlenecks and what's being impacted
 - Anomalies occurred that impacted resource usage and/or performance
- System/Workload Optimization, Prediction and Forecasting
 - Available capacity to move workloads / applications to alleviate bottlenecks
 - Balance resource usage across servers/LPARs/VMs and defer capacity upgrade
 - Enough available capacity to add new workloads/applications to current environment



IBM Capacity Management Analytics: Systems Management

Dashboard & report capabilities provide executives, managers, capacity & performance specialists with custom views



IBM Capacity Management Analytics: Predictive Analytics, Capacity Forecasting & Real-time Scoring

- Predictive analytics helps organizations use data to make better decisions
 - Draw reliable, data-driven conclusions about current conditions and future events.
- Requirements forecasted to ensure sufficient capacity available when business needs it.
- Real-time scoring of transactions performed enabling comparison to forecast.



IBM SmartCloud Application Performance Management

Ensure the performance of your critical applications

• A single solution to monitor the complete application

- Holistic management for critical applications regardless of Cloud, Virtualized, Traditional IT, or Hybrid deployment
- Understand what end users are experiencing
- Rapidly isolate bottlenecks and restore availability and performance

• Deliver On Business Objectives

- Deliver application value to the business
- Meet SLAs
- Lower application costs while improving performance



Questions & Answers



Thank You!