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.

"It’s What You Don’t See that Sinks Ships."
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: end-user 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.
Benefits to Effective Application Performance Management

- Ensure application response meets business expectations
- Understand transaction flows over complex topologies
- Drive close collaboration between departments
- Monitor infrastructure performance and availability
- Diagnose application performance issues
- Increase application availability and customer satisfaction
- Improve MTTR and MTBF
Application Performance Management Workflow

**Sense**
Detect that a threshold has been breached and that a problem occurred, or is about to happen.

**Isolate**
Pinpoint the problem to a specific part of the environment and hand-off to the appropriate specialist.

**Diagnose**
Drill down into the details and get to the root cause of the problem.

**Repair**
Fix the faulty component, validate the fix and roll back into production.

ITCAM for Transactions

- ITM
- ITCAM for AD
- ITCAM for SOA
- OMEGAMONs

Deep-dive tools
The Issue – Sensing and Isolating a Problem Today

**Step 1**
Response time is terrible; more than 1 minute

**Step 2**
Check all resources
- System Alerts
- Health Monitors
- OS Statistics
- Network traffic
- Application log files
- Database metrics

**Step 3**
Everything looks normal ... but performance is still bad

**Step 4**
Bridge Call with Tiger Team
Involves IT Ops, Web admin, network admin, server admin, etc. when only one will be responsible for failing component

**Step 5**
Locate Source of Problem ... maybe ...
- Finger-pointing: "It's the network guy's fault"
- Recreating problem is difficult
- Isolating cause can take hours or days
- Solutions by chance
Customer Value – Demonstrating ROI

**Money wasted** isolating problems

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sev 1 outages/slowdowns per year</td>
<td>12</td>
</tr>
<tr>
<td>Average time to isolate (hrs)</td>
<td>8</td>
</tr>
<tr>
<td>SME’s involved in isolation</td>
<td>15</td>
</tr>
<tr>
<td>Avg. loaded hourly rate (/hr)</td>
<td>$75</td>
</tr>
<tr>
<td>Total direct costs</td>
<td>$108,000</td>
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</tbody>
</table>

**Revenue lost** during outages

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost revenue per hour</td>
<td>$50,000</td>
</tr>
<tr>
<td>Hours downtime / yr</td>
<td>96</td>
</tr>
<tr>
<td>Total indirect costs</td>
<td>$4,800,000</td>
</tr>
</tbody>
</table>

**Total costs** of poor problem isolation capability

<table>
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<tr>
<th>Description</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Total lost / yr</td>
<td>$4,908,000</td>
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Every customer case will be different …

…**what do you** lose each year due to poor performance?
End-to-End Monitoring, Tracking and Diagnosis

1. **Response Time Measurement**
   Start by monitoring transaction performance and end-user problems

2. **Transaction Tracking**
   Correlate data from app server, MQ, CICS, IMS, custom instrumentation, etc. to show topology and isolate problems

3. **Deep Dive Diagnostics**
   Launch in context to SME tools where appropriate. In this scenario, the problem is a WebSphere JEE memory leak.

### Transaction Root Cause Analysis

<table>
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<tr>
<td>1. <strong>Sense</strong></td>
<td>End User Experience and alert on threshold violation</td>
</tr>
<tr>
<td>1. <strong>Isolate</strong></td>
<td>by measuring performance data against baseline through entire infrastructure</td>
</tr>
<tr>
<td>1. <strong>Diagnose and repair</strong></td>
<td>through launch-in-context into deep-dive diagnostics</td>
</tr>
</tbody>
</table>
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 before the customers complain

50% of problems found through customer complaints to help desk!
Real User Monitoring

Web Applications - Agentless

- Captures performance and availability data of actual users for SLA reporting
- Completely non-invasive, agentless monitoring
- Monitors network traffic for HTTP(S) requests to the web server
Agentless Real-User (Passive) Monitoring

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)
Robotic Monitoring

- 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

Quick and easy to deploy
- Install ITCAM for Transactions 7.3
- One simple network configuration change enables tracking of an entire network segment
- No impact to any production servers or applications

Immediate value, immediate visibility
- Server and component topology plus performance metrics
- Hotspot analysis on baselined deviations
- Understand client impact

Customize for your environment
- Add custom network applications
- Build dedicated environment topology per server, per technology
Enterprise-Wide Tracking

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

“Stitching” links correlated sections through dynamic correlation

Builds topology mappings using token-based and dynamic correlation
Transaction Tracking Topology

- Green arrow indicates start node
- Red “hot spot” indicates bottleneck
- Synchronous transactions
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 shows middleware topology.

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.
Red arrow indicates a response time deviation above 100%. The high-lighted icon indicates a problem with DB2 associated with the CICS transaction CKBP.
Right-click on the DB2 icon enables launch to Omegamon for DB2
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.

Zoom in to see the CICS STC and DB2 subsystem names.
A search facility allows the user to locate a specific transaction (in this case the CICS transaction name) on a complex topology workspace. The focus can be moved (zoom in) to the relevant section of the topology display.
Another example of a 4-way sysplex with distributed systems connected to z/OS using WMQ. The distributed application drives CICS and DB/2 on the host.
4-Way Sysplex WMQ → CICS → DB2

Distributed

z/OS SYS1

z/OS SYS2

Distributed
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**
- 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.

**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

*Capitalware’s MQ Technical Conference v2.0.1.4*
SmartCloud Log Analytics

- 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**
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

**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

**IBM Analytics solutions for System z**

**Predict**
- OMEGAMON & NetView w/ IBM zAware
- IBM Cloud Analytics - Predictive Insights

**Search**
- IBM Cloud Analytics - Log Analysis z/OS Insight Packs

**Optimize**
- Capacity Management Analytics (CMA)

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

**Avoid Outages** and service degradation through early detection of abnormalities.

**Improve insight** though the analytical discovery of metric relationships and trends.

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

**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

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

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
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!
- 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!