IBM z Systems Technology Summit

Using Proactive Analytics to Better Manage Your IT Operations

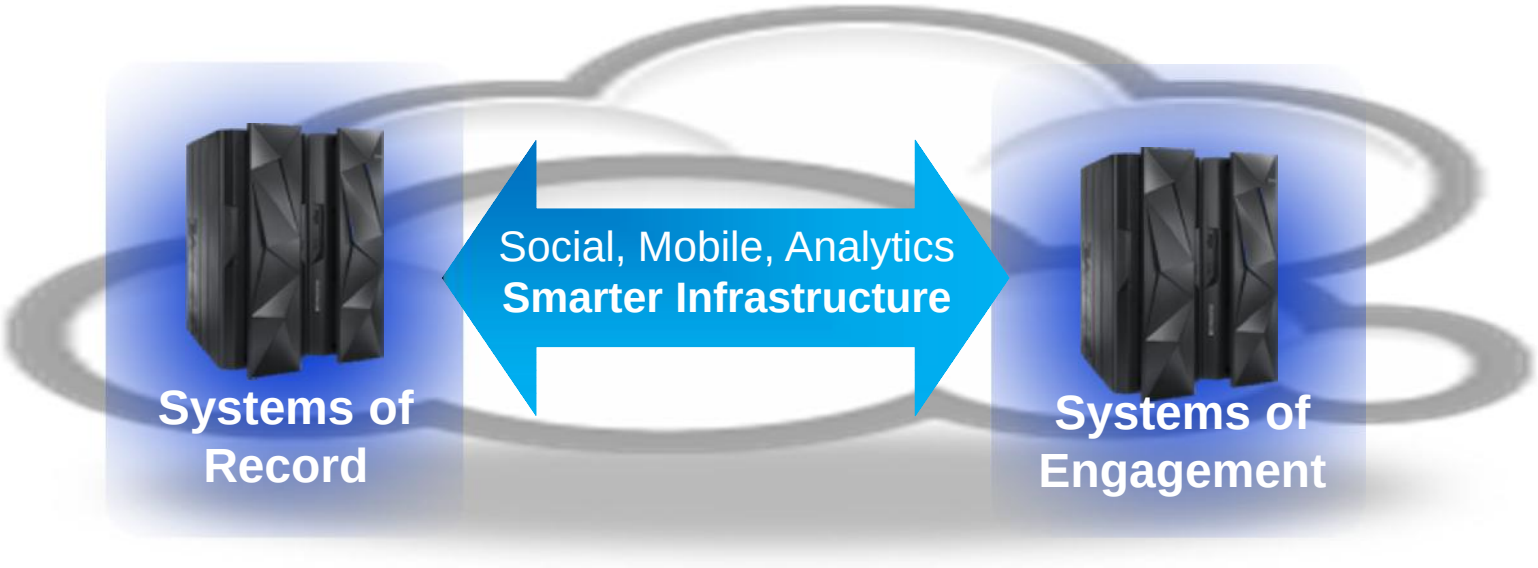
Track 5 Session 2 :

End to end picture made easier to manage with a complete Analytics solution providing coverage for Predict, Search and Optimize.

DC • Costa Mesa • Chicago • Cincinnati • Toronto • Atlanta • NYC • San Francisco • Dallas

Rapid growth of data from next generation technologies can be supported seamlessly on z Systems

System z scaling model and security to manage and optimize both

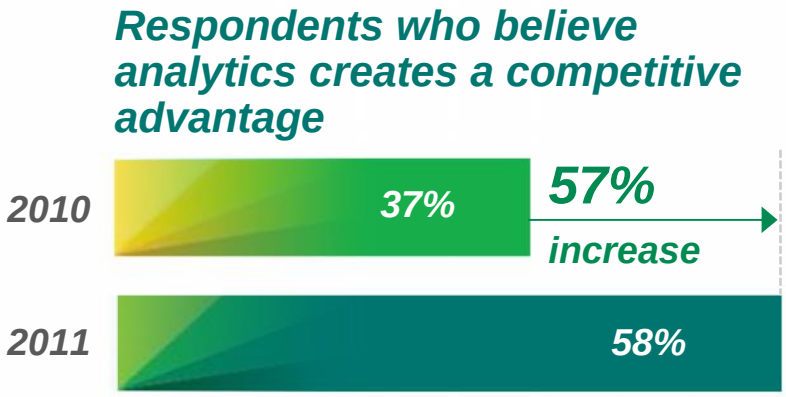


- Business Transactions
- Quality of Service
- Command & Control
- Facts and data “source of truth”
- z Systems

- Mobile and Social
- Dynamic
- Interactions and Collaboration
- Insight, trends, analytics
- Linux on z

Organizations using analytics have been shown to outperform competition and improve business results

More organizations are using analytics to create a competitive advantage



Source: The New Intelligent Enterprise, a joint MIT Sloan Management Review and IBM Institute of Business Value analytics research partnership.

And leaders are outperforming their competitors in key financial measures

1.6x ***Revenue growth***

2.0x ***EBITDA growth (pre-tax net income growth)***

2.5x ***Stock price appreciation***

Source: Outperforming in a data-rich, hyper-connected world, IBM Center for Applied Insights study conducted in cooperation with the Economist Intelligence Unit and the IBM Institute of Business Value. 2012

Analytics strategy is now mission critical and impact bottom line results across all industries and IT

Industries

Banking
Increase account profitability

Insurance
Retain policy holders with better service & marketing

Retail
Understand sales patterns

Telecommunications
Reduce churn with custom retention offers

Operations

Industrial
Predict maintenance issues before occur

Retail
Improve store performance with P&L reports

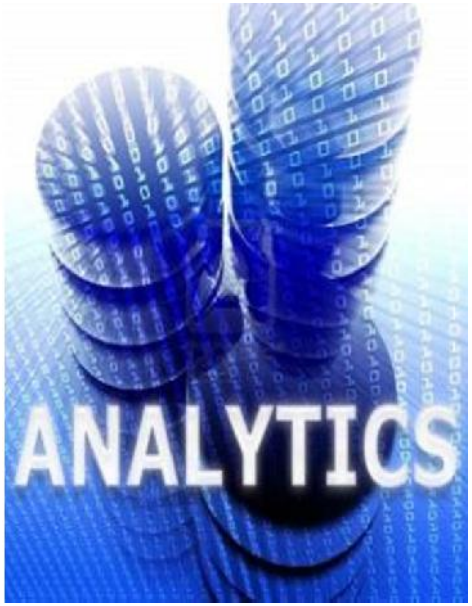
Telecommunications
Understand & manage network traffic

Insurance
Streamline claims process

Government
Reduce fraud and waste

Analytics for System z addresses rapid growth of data and next generation technology requirements

- **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**.**
  - 100x to 1000x explosion in data flooding existing tools.
  - New runtimes, programming languages needing complex instrumentation.
- By 2016, **40% 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 improved performance and workload management

IBM Analytics solutions for System z

Proactive Outage Avoidance

Predict

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

- Pro-Active Outage Avoidance
- Predict problems before they occur

Faster Problem Resolution

Search

IBM SmartCloud Analytics - Log Analysis

- Quickly search large volumes of log data from a single search bar
- Perform analysis while searching
- Correlate messages from multiple logs for end-to-end problem diagnosis

Optimized Performance

Optimize

IBM Capacity Management Analytics (CMA)

- Improve performance and forecast capacity across IT Infrastructure

IBM System z Advanced Workload Analysis Reporter (zAware)

Using Analytics to Improve System z Availability

- Cutting edge pattern recognition techniques look at the health of a system to pinpoint deviations from the 'norm'
- Identifies unusual system behavior of z/OS workloads
- Improves problem diagnosis across a set of System z servers
- High speed analytics facilitates the ability to consume large quantities of message logs
- Speeds up the time to decide on appropriate corrective actions on problems before they get bigger and improve availability
- Allow establishment of procedures to prevent reoccurrence
- New technology based on machine learning developed by IBM Research

- Runs in a special purpose firmware partition on zEC12 or zBC12
- Monitors zEC12 or other System z servers running z/OS v1.13 +PTFs or later

zAware's capacity as a 'watch dog' can help to detect unusual behavior in near real time

IBM zAware

IBM zAware runs as a **firmware appliance** on the zEC12

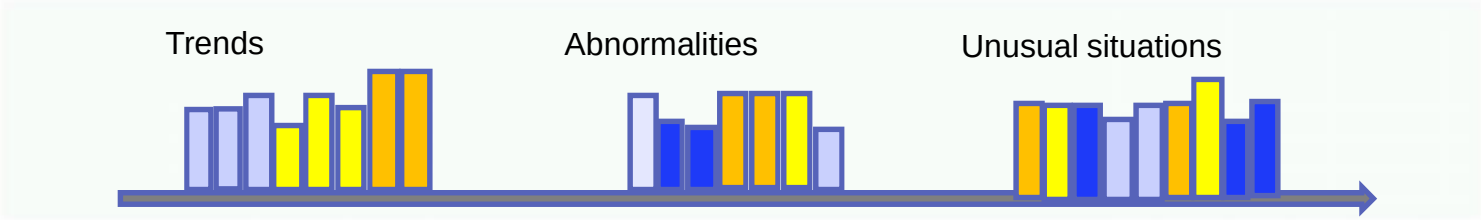
- zAware provides z/OS Message log analysis and anomaly detection in a zEnterprise firmware partition for faster diagnosis and improved availability.
- **Operlog** is fed into zAware and analyzed in near-real time

- **Identify a possible z/OS incident**
  - ***Which image is having a potential problem?***
    - Examines unique messages
    - High score generated by unusual messages or message patterns
  - ***When did this unusual behavior start?***
    - For a selected 10 minute interval either the current 10 minute interval or past intervals
      - **Which messages are unusual?**
      - **How often did the message occur?**
      - **When did the message start to occur?**
  - ***Were similar messages issued in the past?***
    - Understands message characteristics and message patterns

- **Identify behavior after a change has been made**
  - ***Are unusual messages being issued after a change ?***
    - New software levels (operating system, middleware, applications)
    - Updated system settings or system configurations
- **Diagnose intermittent problems**
  - ***Are new unusual messages being issued in advance of the problem?***
    - Are more messages issued then expected?
    - Are messages issued out of a normal pattern?

Appeals to IT VP, Support, Operations, Systems Staff, Service Centers

Finds Anomalies that Would be Manually Hard to Detect



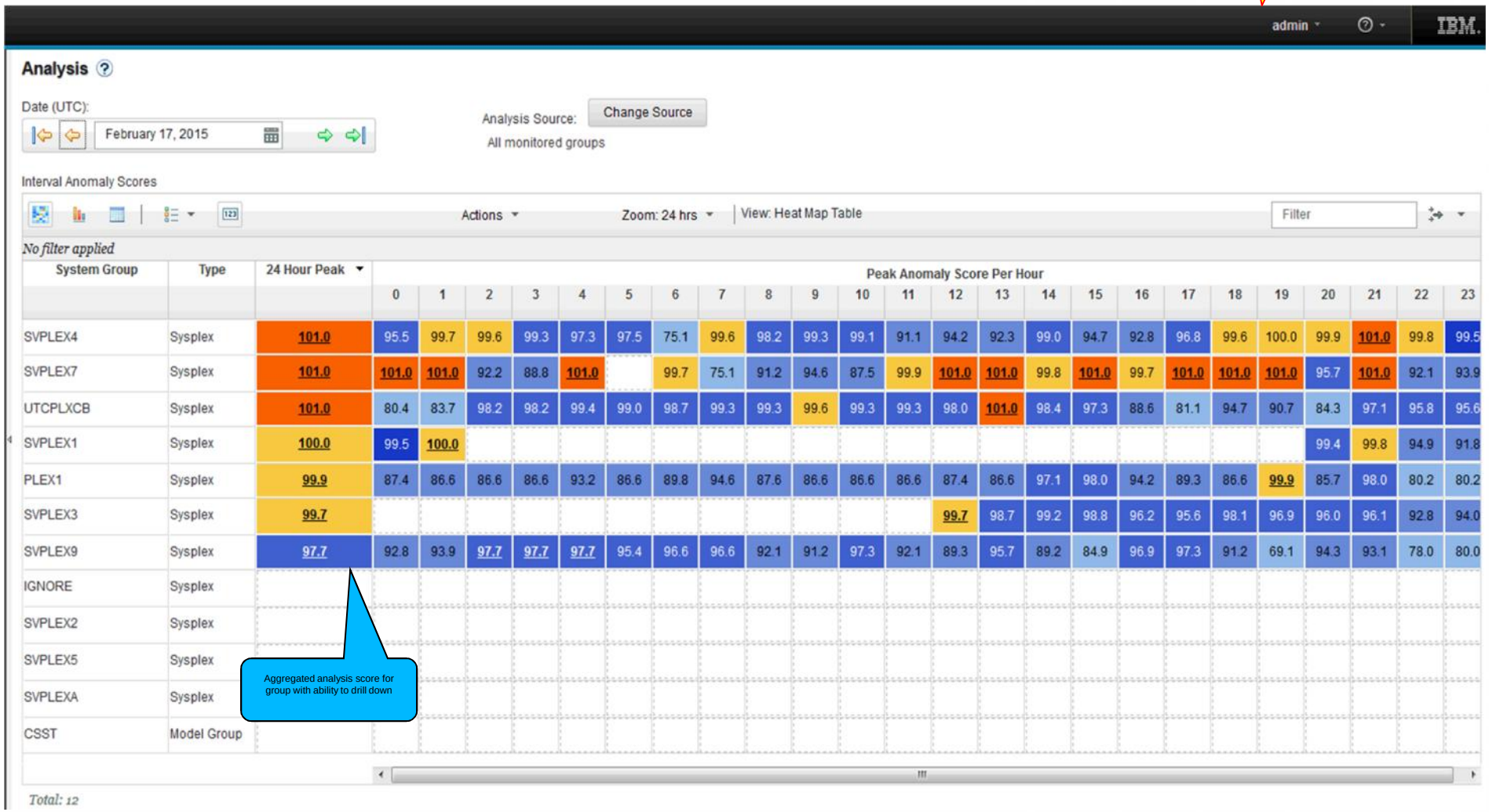
Reduces time and effort to identify & diagnose problematic messages

Enhanced zAware GUI

- Improved usability and GUI functional enhancements address many customer requirements
  - enhanced filtering, visualization, better use of GUI real estate,
  - improved UI navigation
  - display local time in addition to UTC time
- New improved GUIs are based on IBM One UI guidelines
- Heat map display provides a high level consolidated view with ability to drill down to detail views
  - zOS grouped by sysplex, Linux grouped by model group
  - Scores presented at the hour level
  - Quickly get to all systems in a specific group
  - See the interval summaries per system with the Bar Score view
  - Detailed messages and scores in the Interval view
- Expanded browser support with Firefox ESR 24, 31 and IE 9,10,11

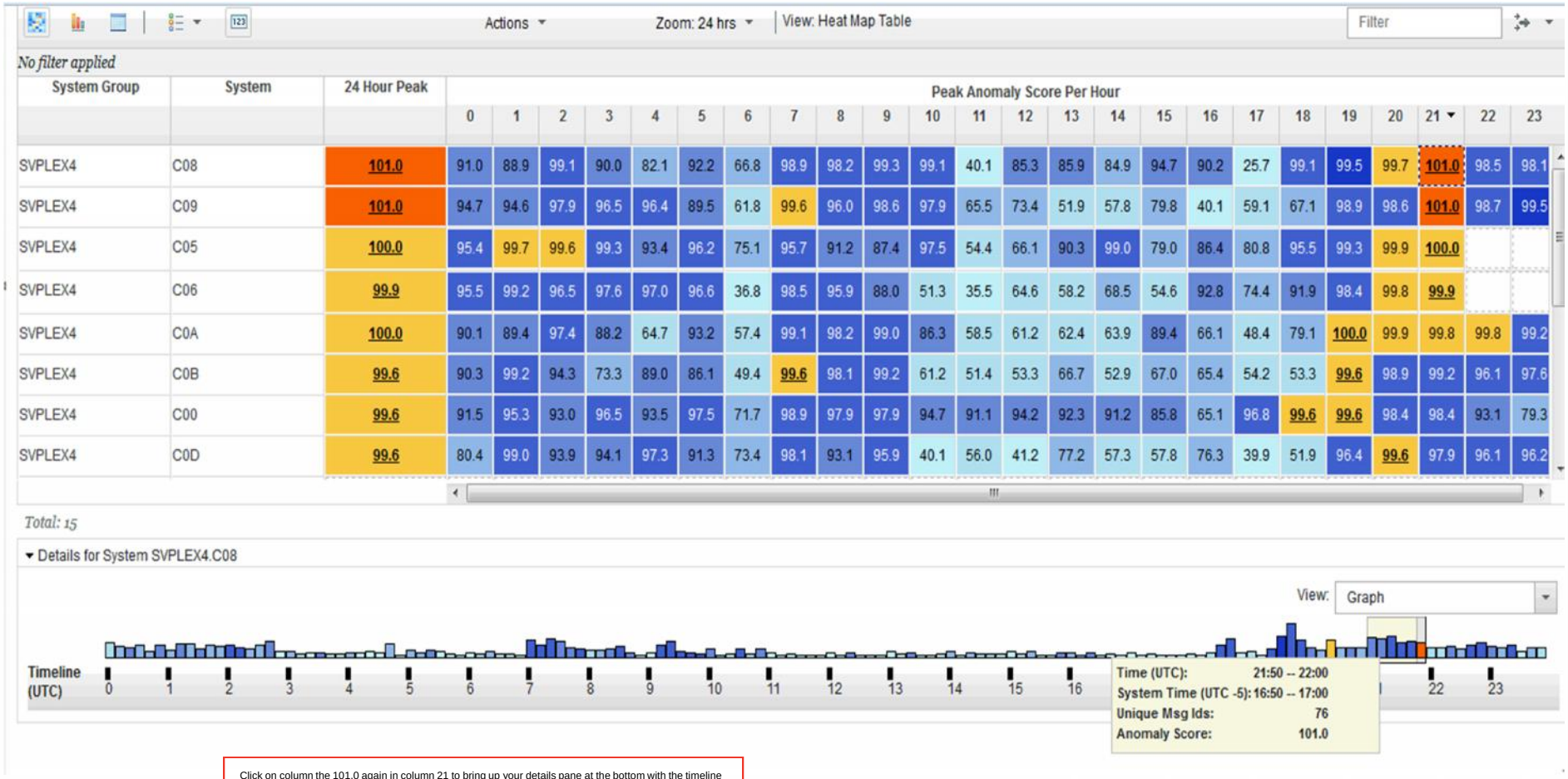
zAware enhanced GUI – Heatmap

New!



Heat Map – All systems in a group w/drilldown

New!

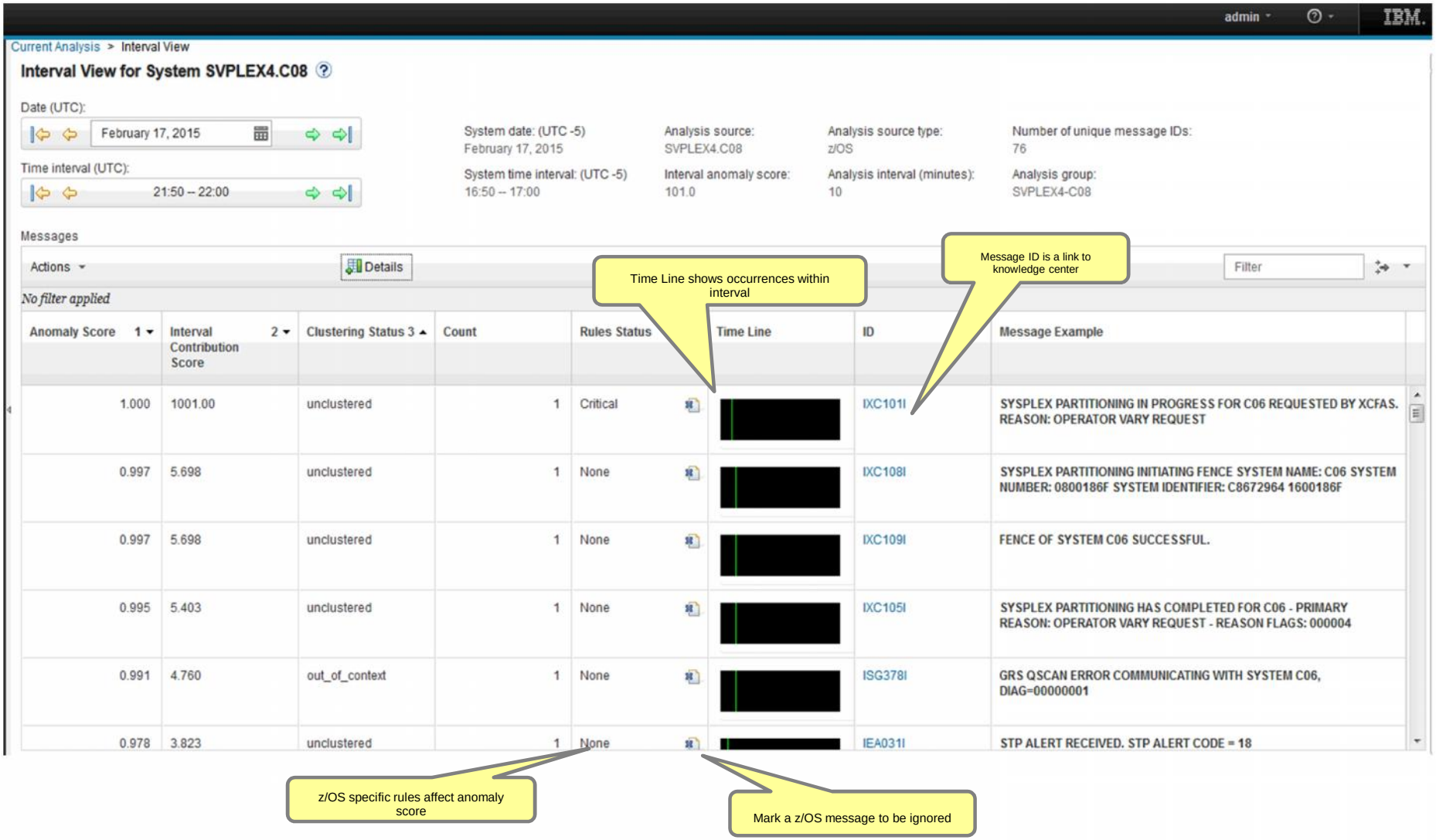


System Group	System	24 Hour Peak	Peak Anomaly Score Per Hour																						
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SVPLEX4	C08	101.0	91.0	88.9	99.1	90.0	82.1	92.2	66.8	98.9	98.2	99.3	99.1	40.1	85.3	85.9	84.9	94.7	90.2	25.7	99.1	99.5	99.7	101.0	98.5	98.1
SVPLEX4	C09	101.0	94.7	94.6	97.9	96.5	96.4	89.5	61.8	99.6	96.0	98.6	97.9	65.5	73.4	51.9	57.8	79.8	40.1	59.1	67.1	98.9	98.6	101.0	98.7	99.5
SVPLEX4	C05	100.0	95.4	99.7	99.6	99.3	93.4	96.2	75.1	95.7	91.2	87.4	97.5	54.4	66.1	90.3	99.0	79.0	86.4	80.8	95.5	99.3	99.9	100.0		
SVPLEX4	C06	99.9	95.5	99.2	96.5	97.6	97.0	96.6	36.8	98.5	95.9	88.0	51.3	35.5	64.6	58.2	68.5	54.6	92.8	74.4	91.9	98.4	99.8	99.9		
SVPLEX4	C0A	100.0	90.1	89.4	97.4	88.2	64.7	93.2	57.4	99.1	98.2	99.0	86.3	58.5	61.2	62.4	63.9	89.4	66.1	48.4	79.1	100.0	99.9	99.8	99.8	99.2
SVPLEX4	C0B	99.6	90.3	99.2	94.3	73.3	89.0	86.1	49.4	99.6	98.1	99.2	61.2	51.4	53.3	66.7	52.9	67.0	65.4	54.2	53.3	99.6	98.9	99.2	96.1	97.6
SVPLEX4	C00	99.6	91.5	95.3	93.0	96.5	93.5	97.5	71.7	98.9	97.9	97.9	94.7	91.1	94.2	92.3	91.2	85.8	65.1	96.8	99.6	99.6	98.4	98.4	93.1	79.3
SVPLEX4	C0D	99.6	80.4	99.0	93.9	94.1	97.3	91.3	73.4	98.1	93.1	95.9	40.1	56.0	41.2	77.2	57.3	57.8	76.3	39.9	51.9	96.4	99.6	97.9	96.1	96.2

Click on column the 101.0 again in column 21 to bring up your details pane at the bottom with the timeline for that hour highlighted.
Hover over an interval for details

Bar Score view with interval summaries

Interval View



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

SmartCloud Analytics – Log Analysis

Differentiating Capabilities

Locate **component error messages** from system, configuration, or software logs **via rapid indexed search**

Isolate issues across various domains including customer session, performance and system faults

Link support documentation and operations notes dynamically to log/warning messages or events to resolve problems quickly

Visualize search results with analytic tools to rapidly **perform root cause analysis**

Delivering Business Results

Reduce mean time to repair by identifying and isolating service impacting issues quickly

Resolve problems more efficiently with faster access to all pertinent information

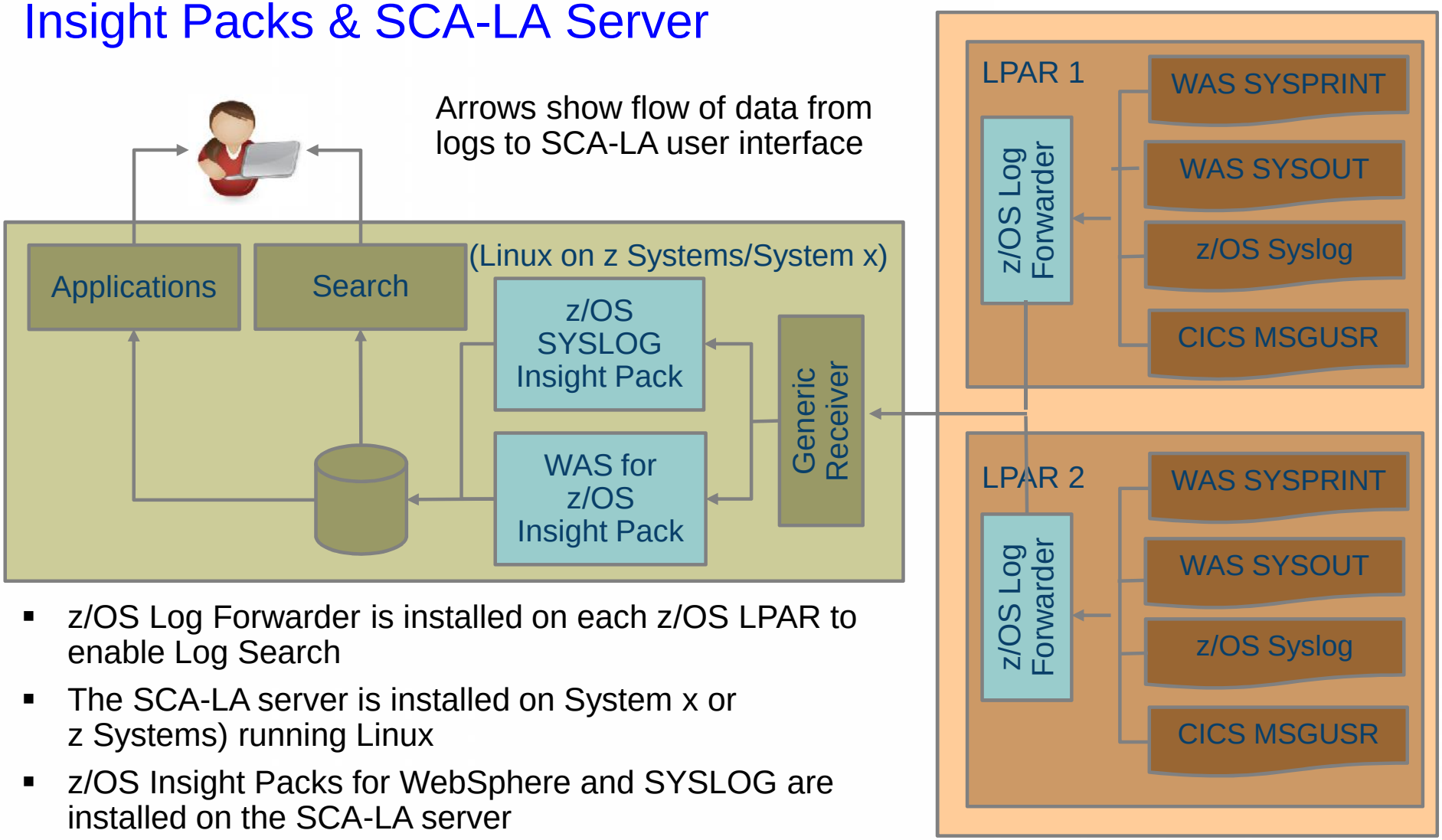
Improve service availability by leveraging expert knowledge of applications and infrastructure

Built on IBM's leading Big Data platform

IBM expertise built-in

Download and install in minutes for quick time-to-value

IBM SmartCloud Analytics – Log Analysis z/OS Insight Packs & SCA-LA Server



- z/OS Log Forwarder is installed on each z/OS LPAR to enable Log Search
- The SCA-LA server is installed on System x or z Systems) running Linux
- z/OS Insight Packs for WebSphere and SYSLOG are installed on the SCA-LA server

Solution Components

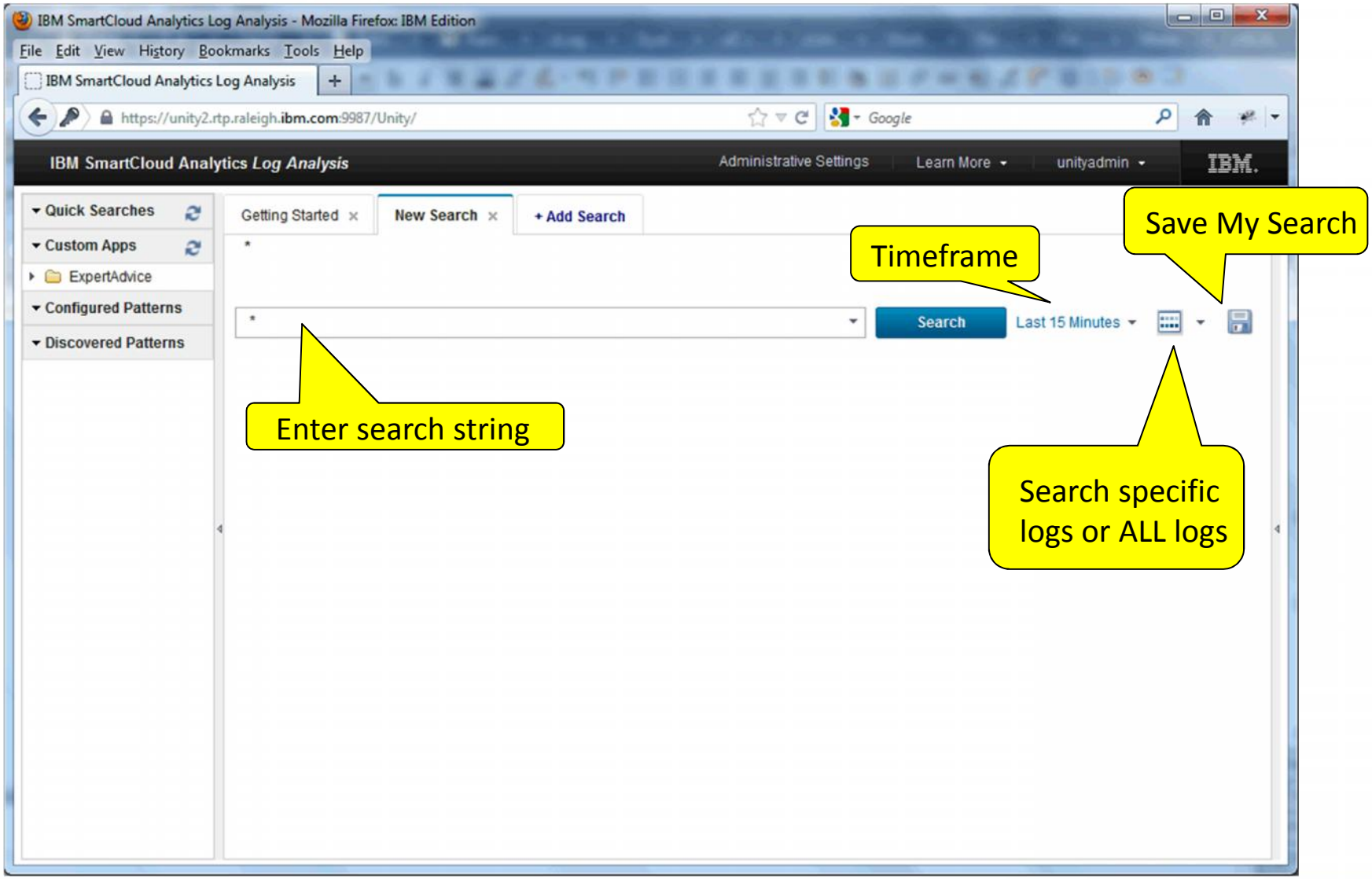
IBM SmartCloud Analytics - Log Analysis z/OS Insight Pack for SYSLOG v1.2.0

- IBM SmartCloud Analytics – Log Analysis (SCA-LA) 1.2.0.3
  - Provides data collection, analytics and storage capabilities, as well as search interface
  - Runs on Linux on z Systems and Linux on x86
- z/OS SYSLOG Insight Pack
  - An Insight Pack that extends SCA-LA so it can ingest and perform searches against DB2, CICS, MQ and IMS for z/OS log data and other log data from the SYSLOG
- z/OS Log Forwarder
  - A specialized SCA-LA data collector client that monitors and forwards z/OS SYSLOG and/or WAS for z/OS log data to SCA-LA
    - Executes independently on each z/OS LPAR that is monitored
    - Configurable to specify which WAS for z/OS jobs (if any) to monitor and whether to monitor the z/OS SYSLOG

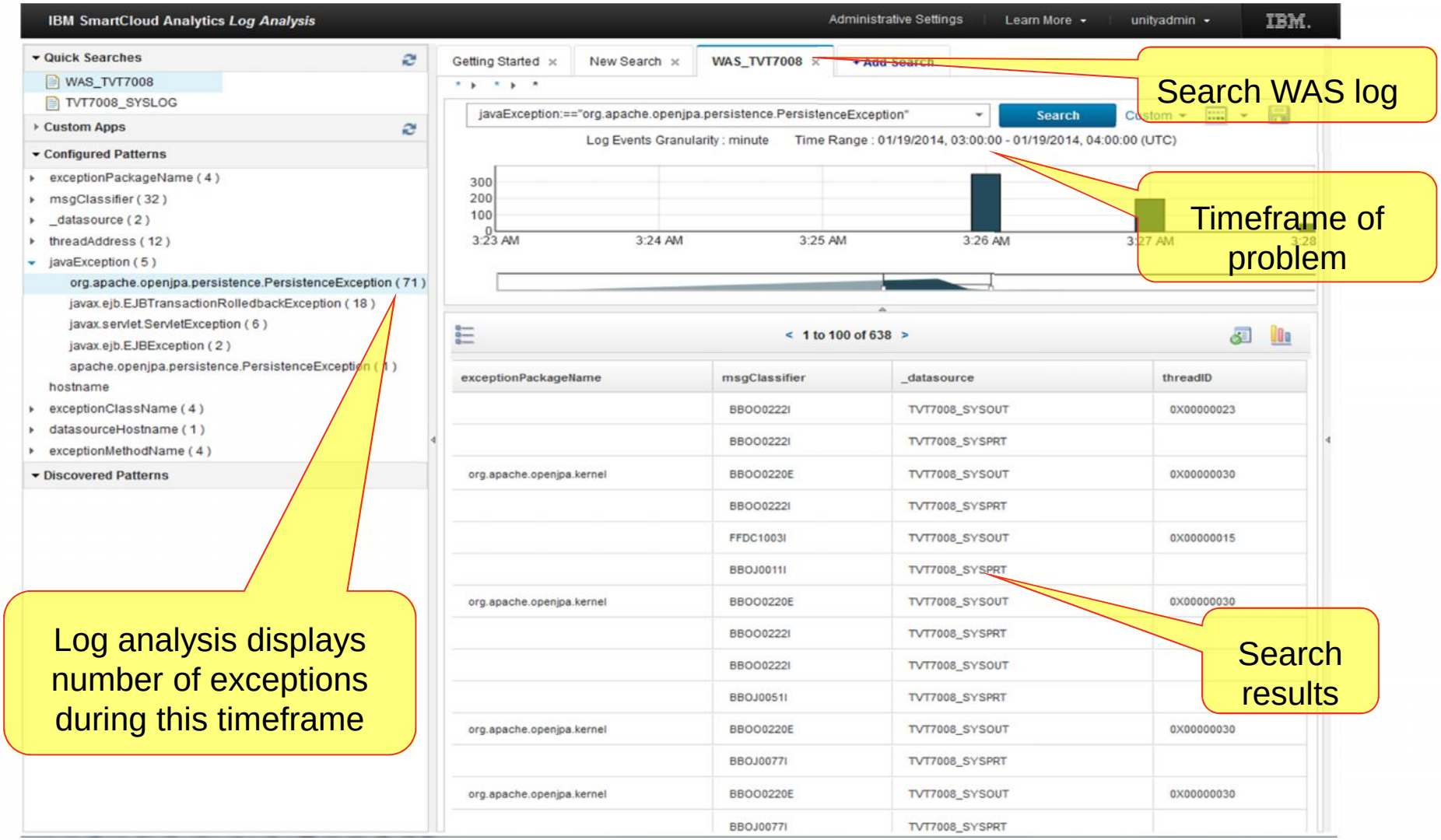
IBM SmartCloud Analytics - Log Analysis z/OS Insight Pack for WebSphere® Application Server v1.2.0

- IBM SmartCloud Analytics – Log Analysis (SCA-LA) 1.2.0.3
  - Provides data collection, analytics and storage capabilities, as well as search interface
  - Runs on Linux on z Systems and Linux on x86
- WebSphere® Application Server for z/OS Insight Pack
  - An Insight Pack that extends SCA-LA so it can ingest and perform searches against WAS for z/OS log data
- z/OS Log Forwarder
  - A specialized SCA-LA data collector client that monitors and forwards z/OS SYSLOG and/or WAS for z/OS log data to SCA-LA
    - Executes independently on each z/OS LPAR that is monitored
    - Configurable to specify which WAS for z/OS jobs (if any) to monitor and whether to monitor the z/OS SYSLOG

Simple Search Interface – Easy to Customize

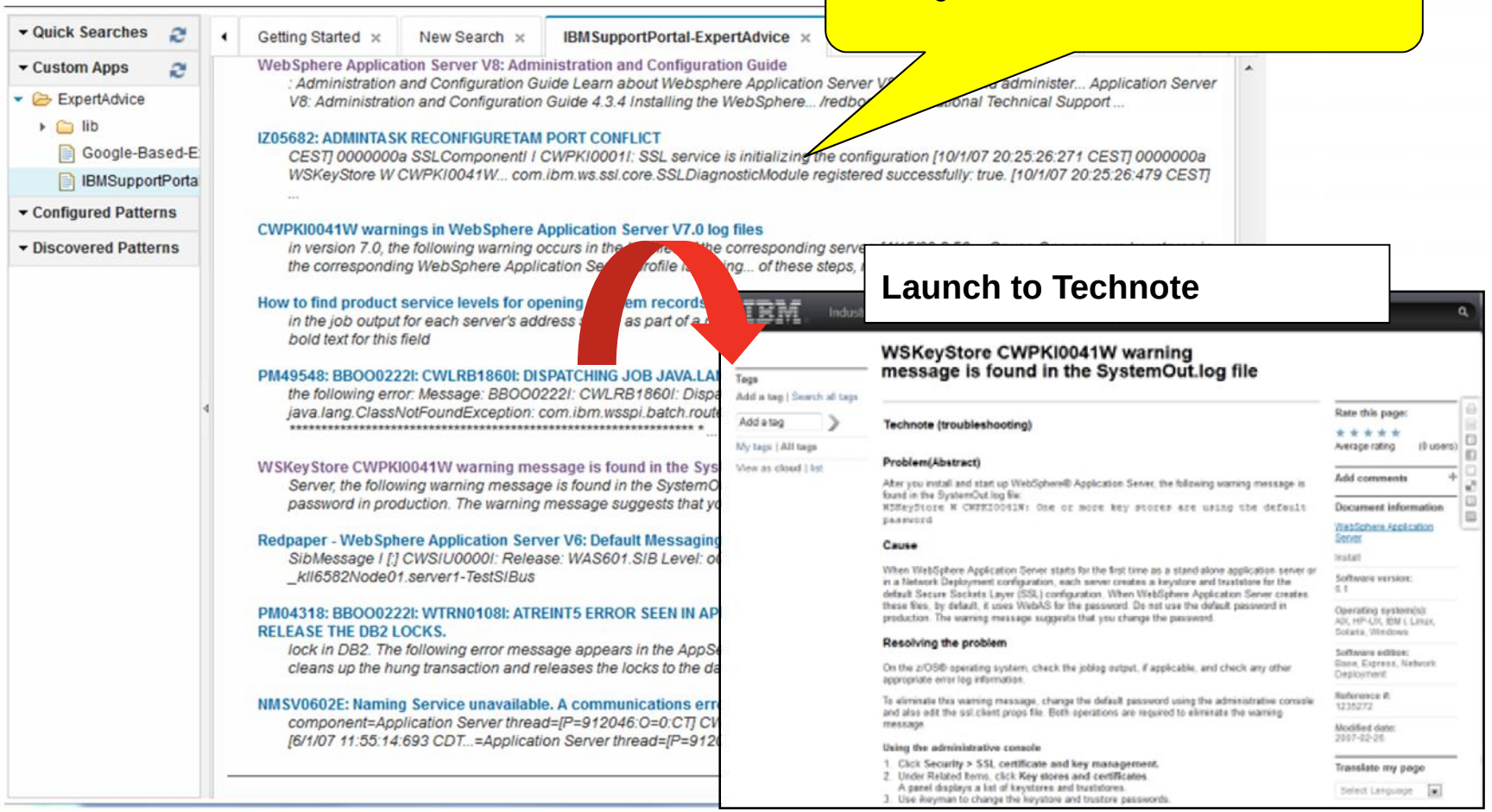


WebSphere Application Server Search – java Exception pattern

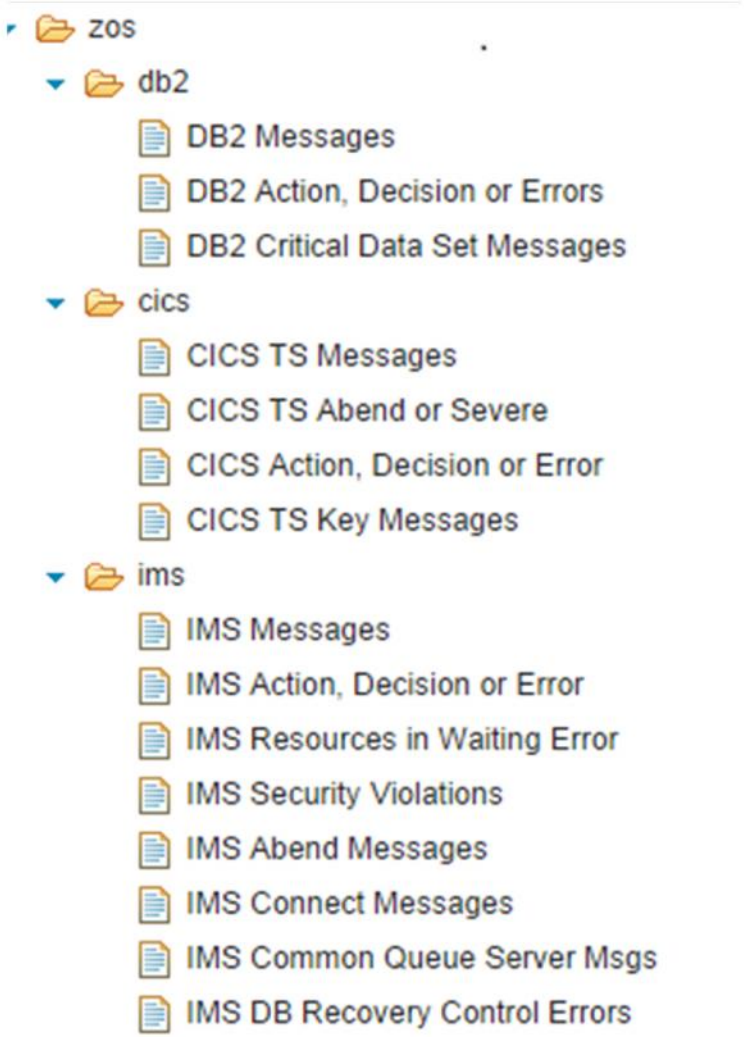


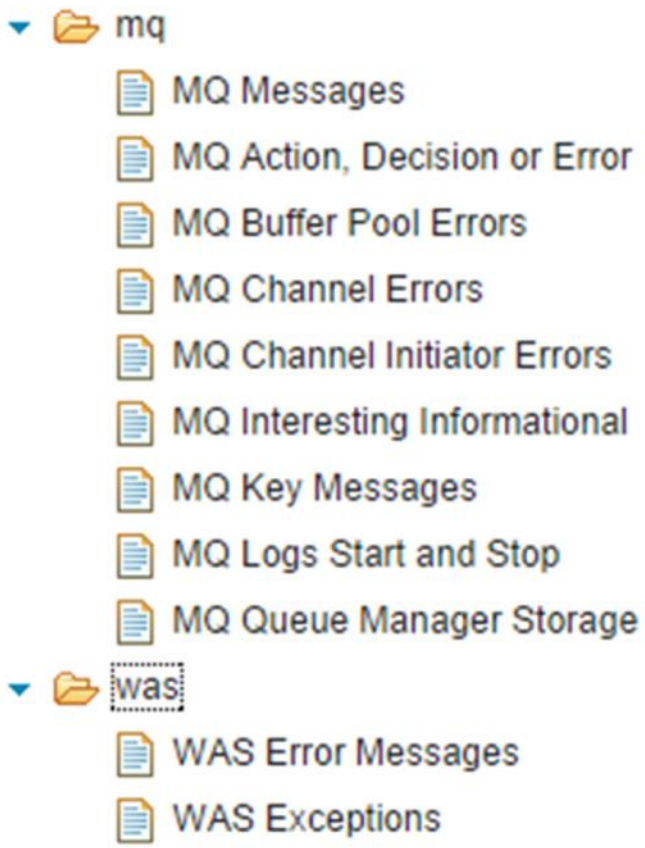
Quickly and easily access IBM Support Portal based Expert Advice from Log Analysis

Search for expert advice with the click of a button



Out of the Box Quick Searches





DB2 and WebSphere Application Server Quick Searches

- **DB2 Messages**
  - This sample searches for all DB2 messages that occurred during the last day.
- **DB2 Action, Decision or Errors**
  - This sample searches for any DB2 messages that occurred during the last day and that indicate any of the following situations:
    - Immediate action is required.
    - A decision is required.
    - An error occurred.
- **DB2 Critical Data Set Messages**
  - This sample searches for messages that indicate that DB2 log data sets are full, are becoming full, or could not be allocated during the last day.
- **WAS Error Messages**
  - This sample searches for any WebSphere Application Server for z/OS messages that occurred in the last day and that indicate an error occurred.
- **WAS Exceptions**
  - This sample searches for any occurrences of Java™ exceptions in the WebSphere Application Logs during the last day.

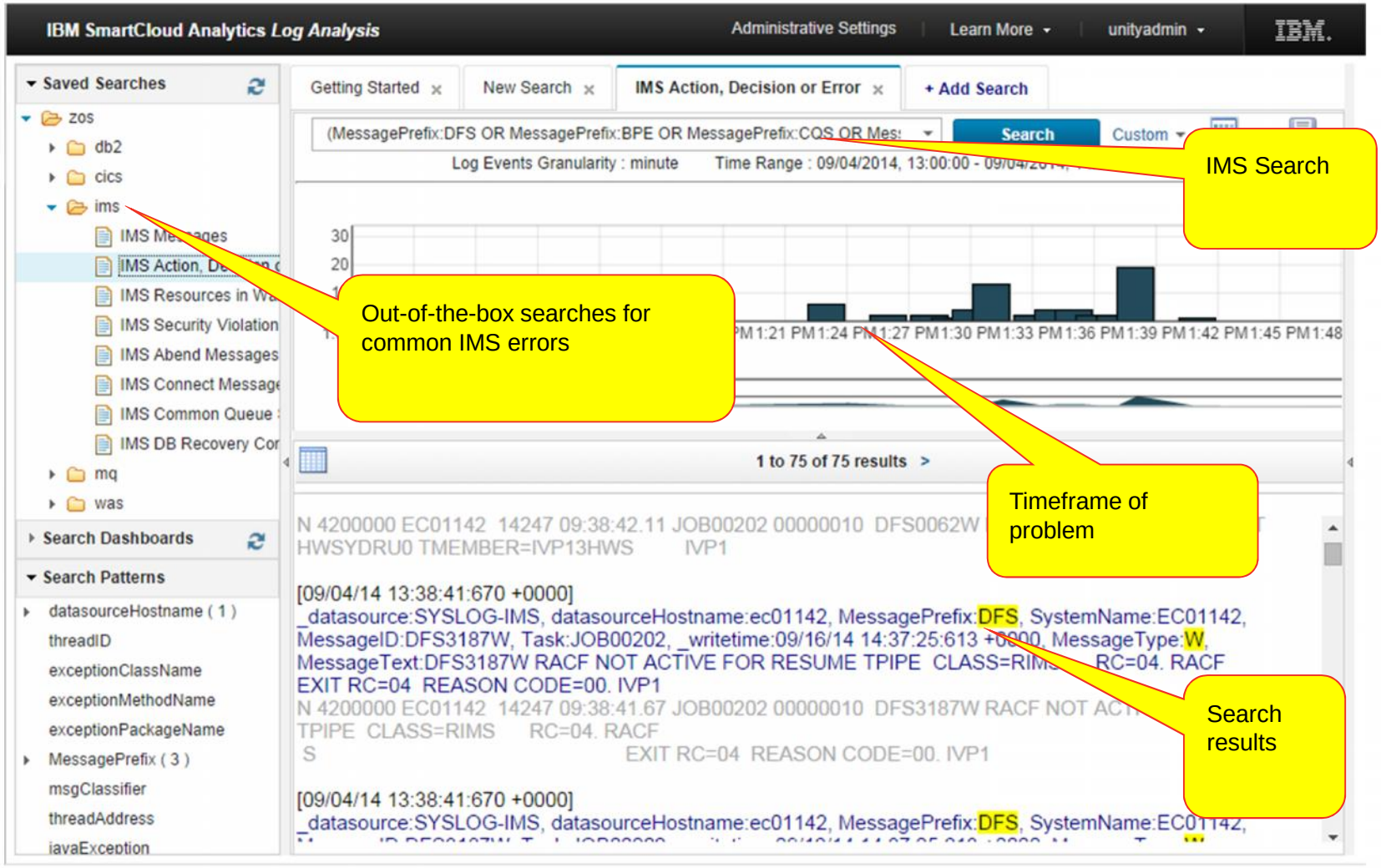
CICS Quick Searches

- **CICS TS Messages**
  - This sample searches for all CICS Transaction Server messages that occurred during the last day.
- **CICS TS Abend or Severe**
  - This sample searches for CICS Transaction Server messages that have all of the following characteristics:
    - The messages occurred during the last day.
    - The messages have the format `DFHccxxxx`, where cc represents a component identifier (such as `SM` for Storage Manager), and `xxxx` is either `0001` or `0002` (which indicates an abend or severe error in the specified component).
- **CICS Action, Decision or Error**
  - This sample searches for any CICS messages that occurred in the last day and that indicate that immediate action is required **or** that a decision is required **or** that an error occurred.
- **CICS TS Key Messages**
  - This sample searches for a set of predefined message numbers to determine whether any of the corresponding messages occurred during the last day.

IMS Quick Searches

- **IMS Messages**
  - This sample searches for all IMS messages during the last day.
- **IMS Action, Decision or Error**
  - This sample searches for any IMS messages that occurred in the last day and that indicate that immediate action is required **or** that a decision is required **or** that an error occurred.
- **IMS Security Violations**
  - This sample searches for error messages that indicate security violations that have been detected during the last day.
- **IMS Abend Messages**
  - This sample searches for all messages that indicate abends that have been detected during the last day.
- **IMS Common Queue Server Msgs**
  - This sample searches for all messages in the IMS Common Queue Server component during the last day.
- **IMS Resources in Waiting Error**
  - This sample searches for error messages that indicate that a resource is waiting on other resources to become available during the last day.
- **IMS DB Recovery Control Errors**
  - This sample searches for all error messages in the DB Recovery Control component during the last day.
- **IMS Connect Messages**
  - This sample searches for all messages in the IMS Connect component during the last day.

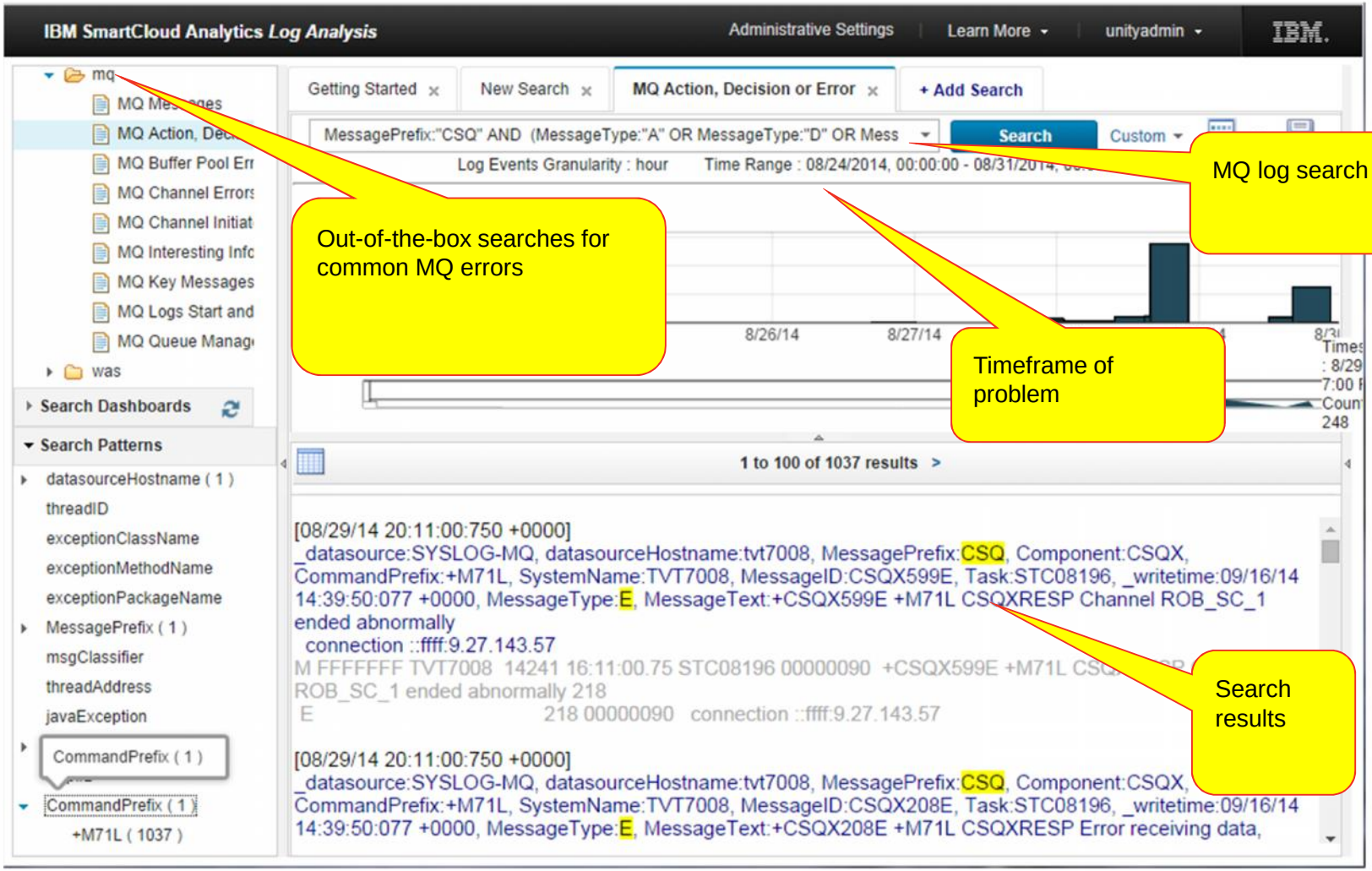
IMS search results from out-of-the-box searches



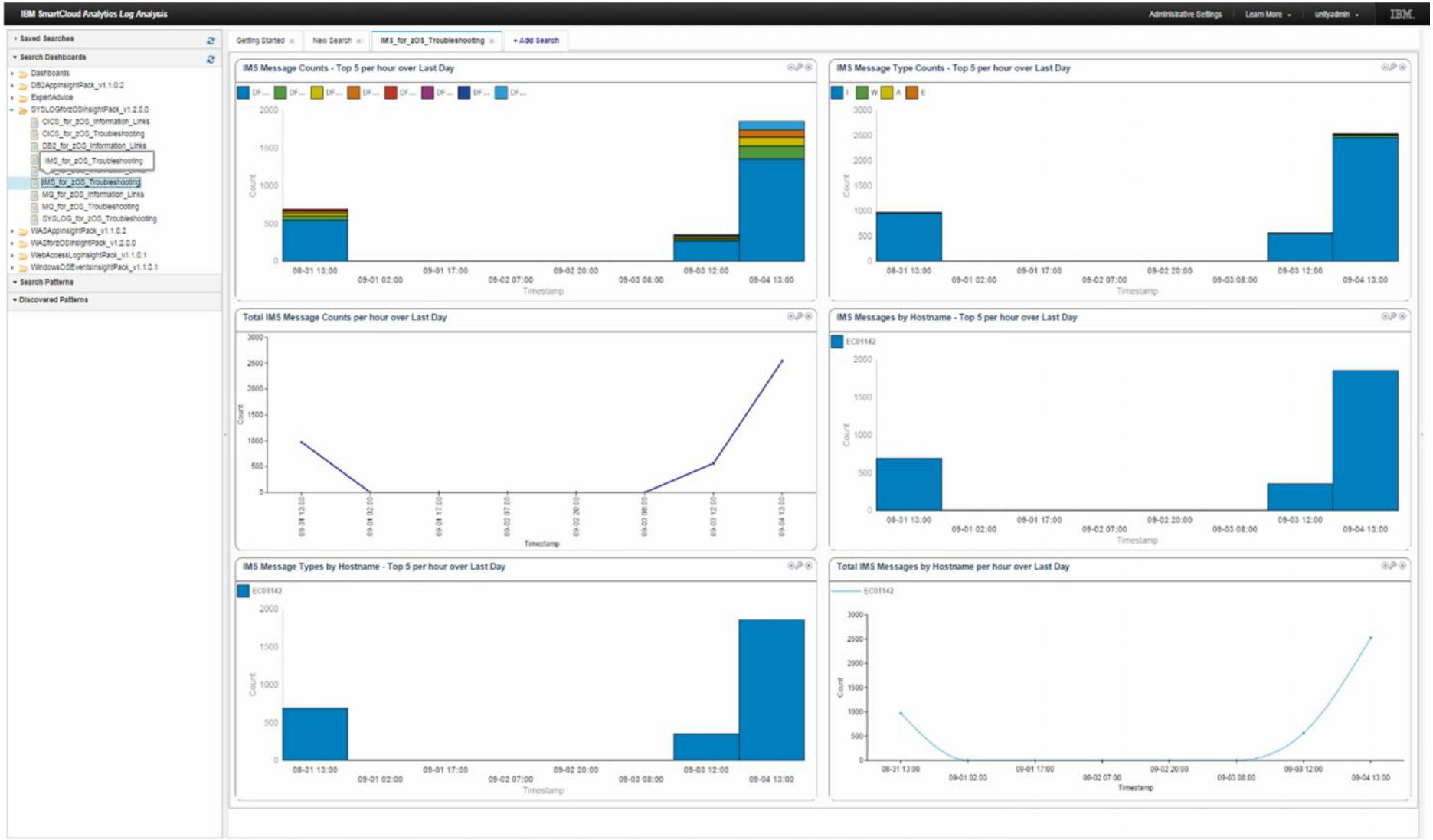
WebSphere MQ Quick Searches

- **MQ Messages**
  - This sample searches for all WebSphere MQ messages during the last day.
- **MQ Action, Decision or Error**
  - This sample searches for any WebSphere MQ messages that occurred in the last day and that indicate that immediate action is required **or** that a decision is required **or** that an error occurred.
- **MQ Queue Manager Storage**
  - This sample searches for messages that indicate that Websphere MQ Queue Manager is short of storage or is no longer short of storage during the last day.
- **MQ Logs Start and Stop**
  - This sample searches for messages related to the starting, stopping and flushing of the WebSphere MQ log data sets during the last day.
- **MQ Key Messages**
  - This sample searches for a set of predefined message numbers to determine whether any of the corresponding messages occurred in the last day.
- **MQ Interesting Informational**
  - This sample searches for a set of predefined information message numbers that might warrant attention to determine whether any of the corresponding messages occurred in the last day.
- **MQ Channel Initiator Errors**
  - This sample searches for error messages that indicate Websphere MQ Channel Initiator errors during the last day.
- **MQ Channel Errors**
  - This sample searches for error messages that indicate Websphere MQ Channel errors during the last day.
- **MQ Buffer Pool Errors**
  - This sample searches for error messages that indicate Websphere MQ Buffer Pool errors during the last day.

MQ search results from out-of-the-box searches



Sample dashboard

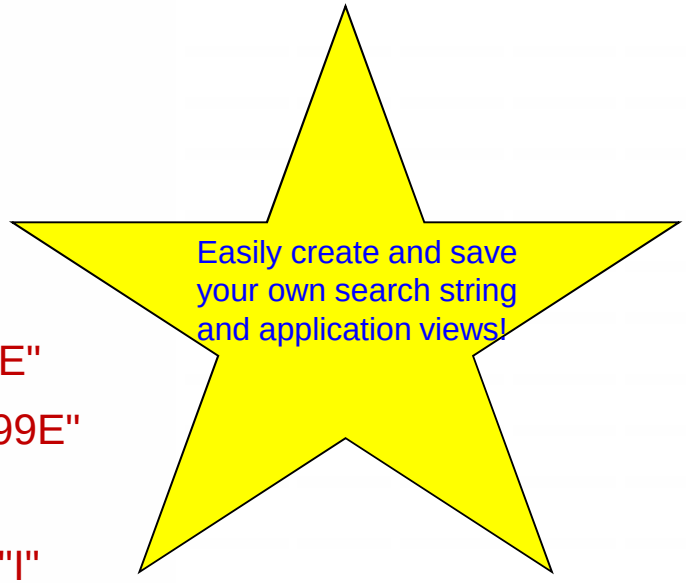


Application Views

- For each supported z/OS domain, a set of custom applications is provided that graph out incidents over time:
  - Message Counts - Top 5 over last day
  - Messages by Hostname - Top 5 over Last Day
  - Message Type Counts - Top 5 over Last Day
  - Message Types by Hostname - Top 5 over Last Day
  - Message Counts - over Last Day
  - Total Messages by Hostname - over Last Day

SCA-LA: Search syntax

- Simple free form searches can be performed
  - Search for “error” for example
- **OR** is the default operator
- **AND** or **+** is the AND operator:
  - +MessageType:"E" + MessageID:"CSQX599E"
  - MessageType:"E" AND MessageID:"CSQX599E"
- Exclude terms with the **NOT** or **–** operator:
  - +MessagePrefix:"CSQ" NOT MessageType:"I"
  - +MessagePrefix:"CSQ" – MessageType:"I“
- Quotes can be used for phrases containing spaces:
  - “ended abnormally”
- Parentheses for grouping:
  - (+MessagePrefix:"CSQ" +MessageType:"E") OR (+MessagePrefix:"CNZ" +MessageType:"E")
- Field designator to restrict search to a particular field:
  - MessagePrefix:"CSQ"

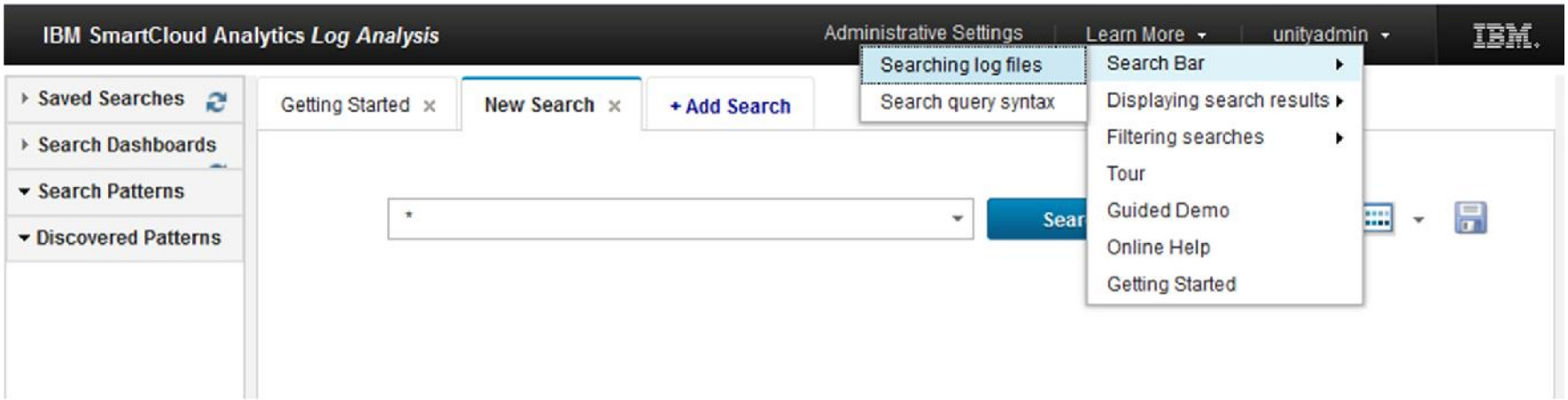


SCA-LA: Search syntax …

- * wildcard for multiple characters:
  - test* might return test, tests or tester.
- ? wildcard for any single character:
  - te?t might return text or test

More advanced queries are possible.

- Online Help available from the **Learn More → Search Bar → Search query syntax** menu:



Customer Experiences

Large Insurance Company

- Experienced an application outage that resulted in the team working around the clock for 29 hours pouring through logs and traces to determine the root cause of the issue. After the issue was resolved, the logs were captured and sent to IBM lab for analysis using SCA-LA. Within minutes, the IBM team was able to see the scope of the issues, and find the relevant PTF to resolve the issue through the integrated expert advice.

State Agency

- Were able to download, install, configure and use SCA-LA to search their logs in 2.5 hours.

Numerous Customers

- Errors lurking in logs that are never examined because they don't necessarily cause SLA or performance problems. For example, SCA-LA found over 4,000 invalid login attempts in a three day period that had otherwise gone unnoticed.

Send us your logs!

- Request a product demo using logs from your own test, development or production environments

- IBM will load your logs into a SCALA server, then demo the results back to you
  - A secure, dedicated drop box will be assigned to you
  - You will be sent detail upload instructions via email

  –Any file uploaded will be automatically moved to a dedicated SCALA environment within 24 hours

  –All log data will be purged from the SCALA environment within 48 hours after the demo event

To request your hosted demo, visit:

http://ibm.biz/zscalademo

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IBM Capacity Management Analytics

Cost effective, optimal use of IT Infrastructure capacity: Today, tomorrow, beyond

A single, integrated cost-effective solution for zEnterprise & Distributed Infrastructures

- System management
- Problem identification and resolution
- Capacity forecasting and monitoring
- Software Cost Analysis

Manage the complete time horizons

- Historical reporting of past performance
- Forecasting future requirements
- Real-time anomaly detection

Jump-start your time to value and ease implementation

- Built on IBM's ease-of-use analytics
- Includes prepackaged, interactive reports
- Optional services and education

Questions capacity management can answer

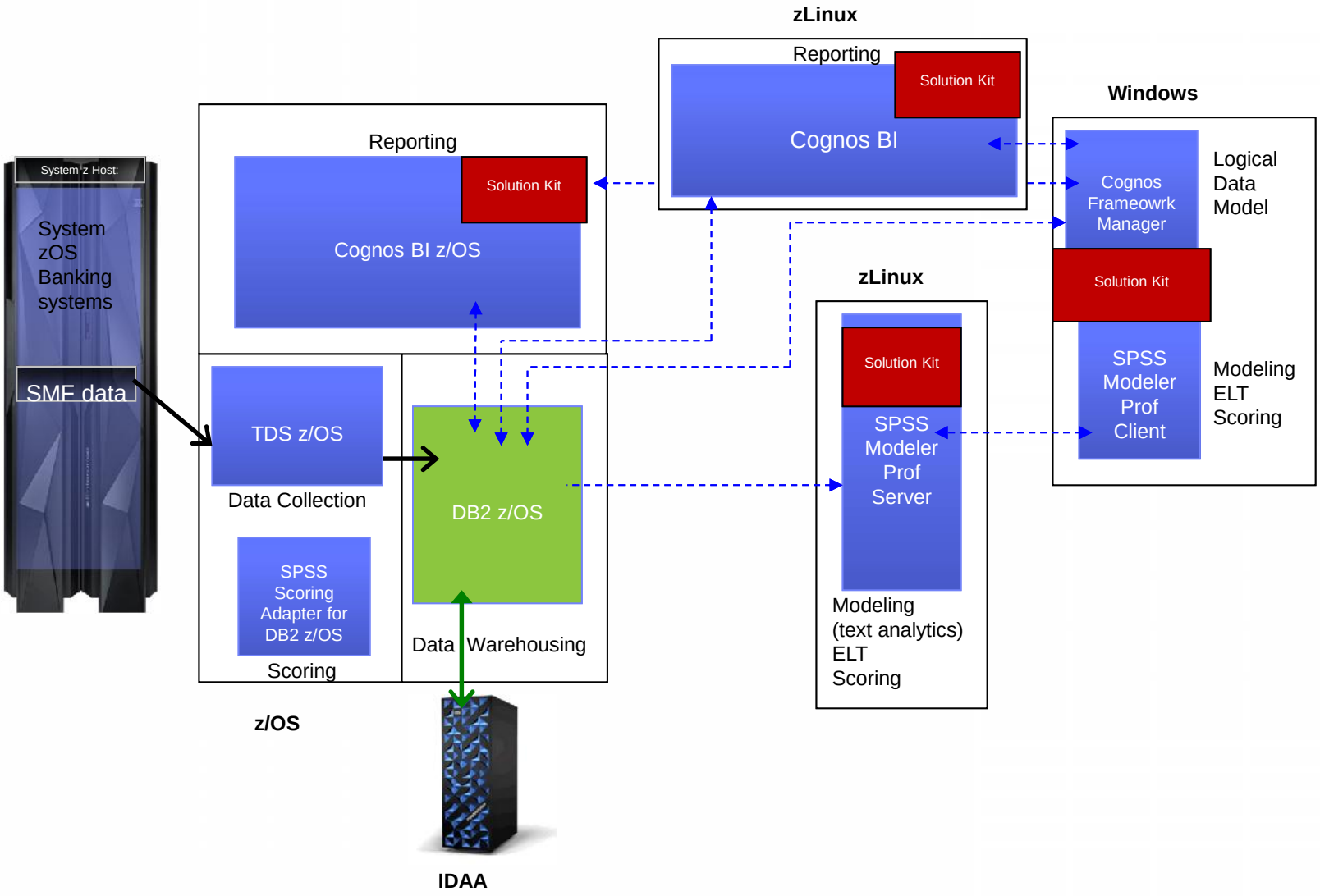
System and workload characteristics, performance and trending

- How is my environment performing?
- What's driving the demand on my capacity?
- Is my IBM Workload Manager environment properly tuned?
- Am I achieving my performance goals?
- Are capacity constraints causing bottlenecks and what is being impacted?
- What anomalies occurred that impacted resource usage, performance or both?

System and workload optimization, prediction and forecasting

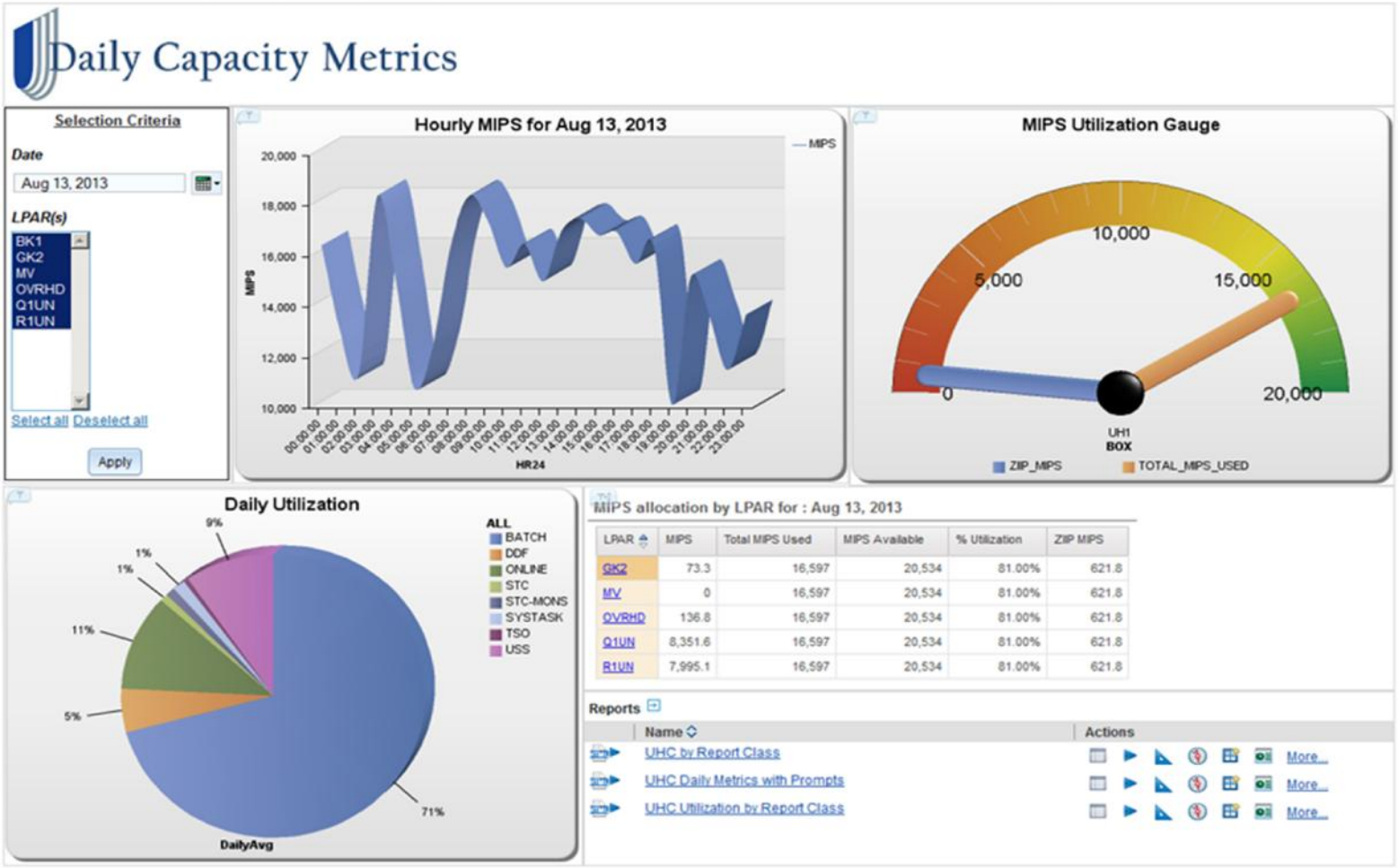
- Do I have windows of available capacity to which I can move workloads and applications in order to alleviate bottlenecks during peak processing?
- Can I better balance my resource usage across servers, logical partitions (LPARs) and virtual machines (VMs) and defer a capacity upgrade?
- Do I have enough available capacity to add new workloads and applications to my current environment?
- When will I need to upgrade capacity in the future to support the planned addition of new workloads and applications?

CMA Architecture



IBM Capacity Management Analytics: Systems Management

IBM CMA's dashboard & report capabilities provide executives, managers, capacity & performance specialists with custom views to analyze, visualize and make informed decisions.

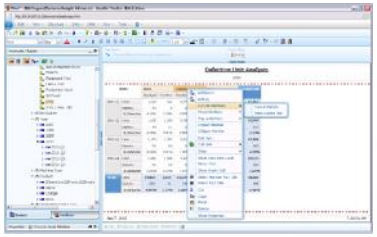


Built on IBM's ease-of-use analytics solution

A workspace with greater power, intuitive navigation & cleaner look

Pixel perfect reporting

Advanced Filtering

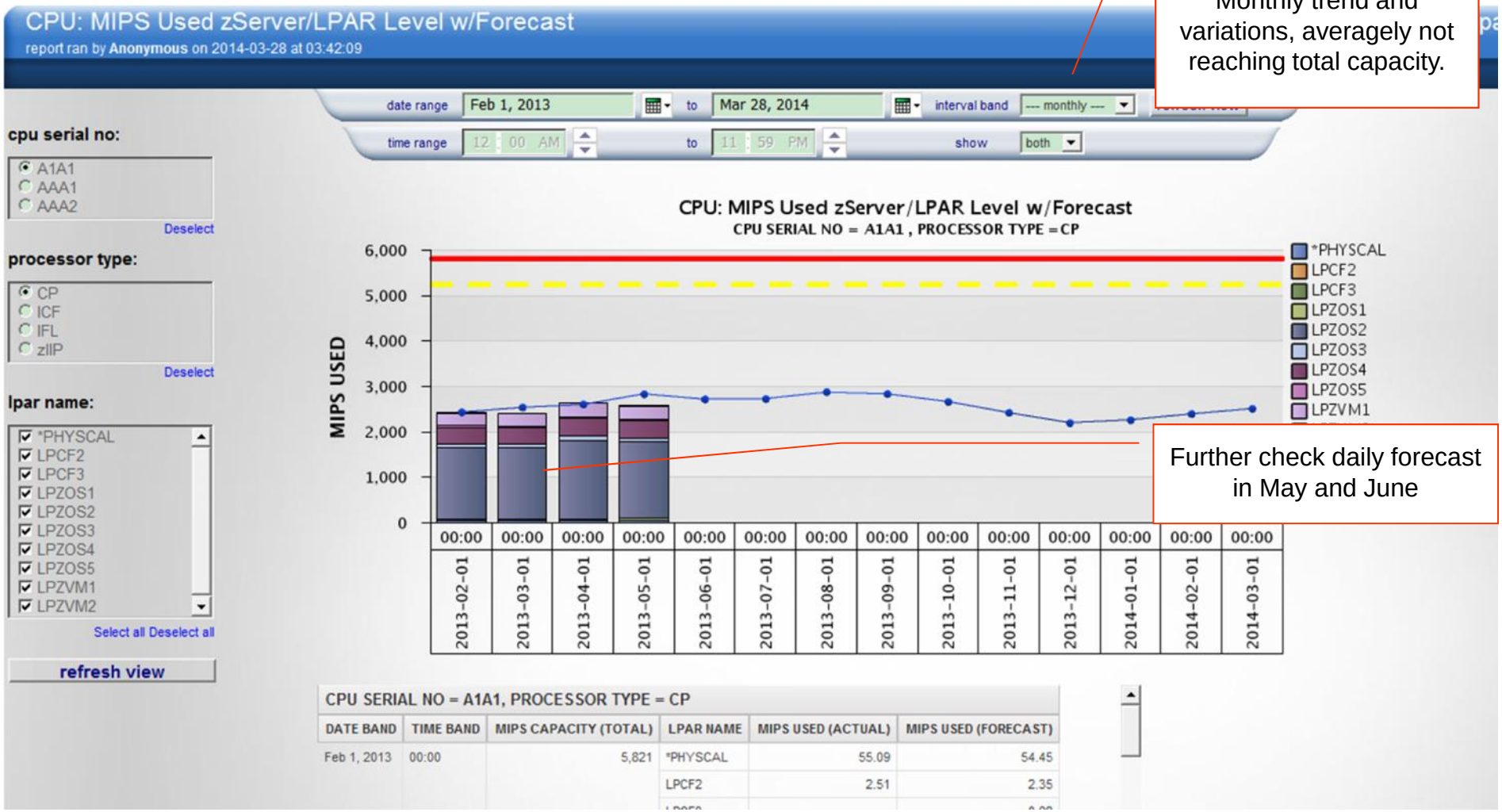


Seamlessly shift to more advanced analysis interaction

Communicate your analysis using Microsoft Office

Analytics on the go with Mobile devices and disconnected interaction

CMA 1.1 Reports – CPU: MIPS Used - zServer/LPAR Level w/Forecast



Monthly trend and variations, averagely not reaching total capacity.

Further check daily forecast in May and June

Summary

- IBM has various solutions for IT analytics that address different use cases.
  - External products that address various use cases
    - **IBM zAware** for proactive anomaly detection and faster diagnosis
    - **SmartCloud Analytics – Log Analysis (SCALA)** for faster problem diagnosis with search and indexing capabilities for large amount of data
    - **Capacity Management Analytics (CMA)** to enable optimal use of z Systems capacity by managing and predicting consumption of IBM® z Systems® infrastructure resources
- Business Analytics and IT analytics are aligning with a converged platform to provide a foundation for enabling analytics across the enterprise.


Thank
You