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IBM zAware:
A smarter way to detect and diagnose system anomalies

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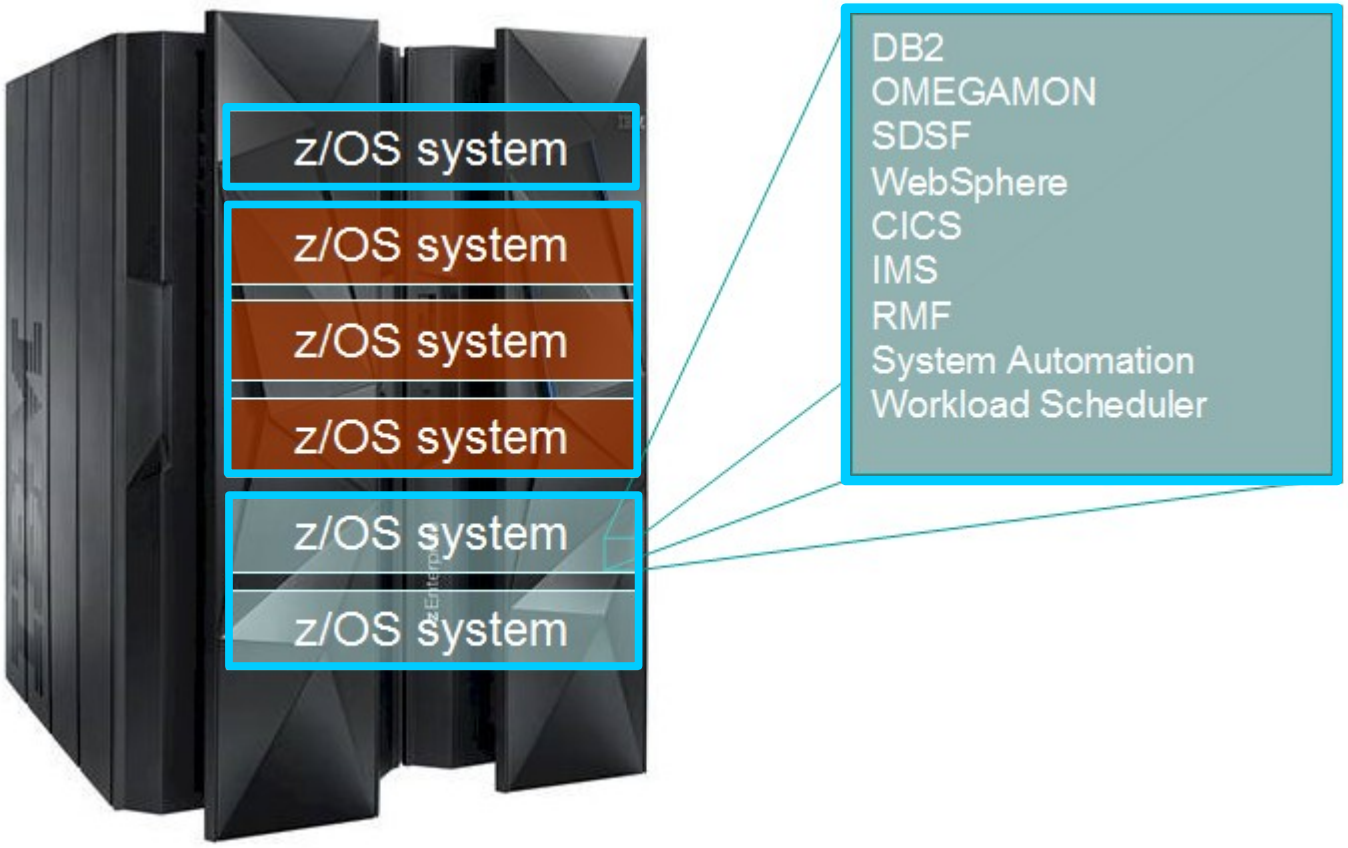
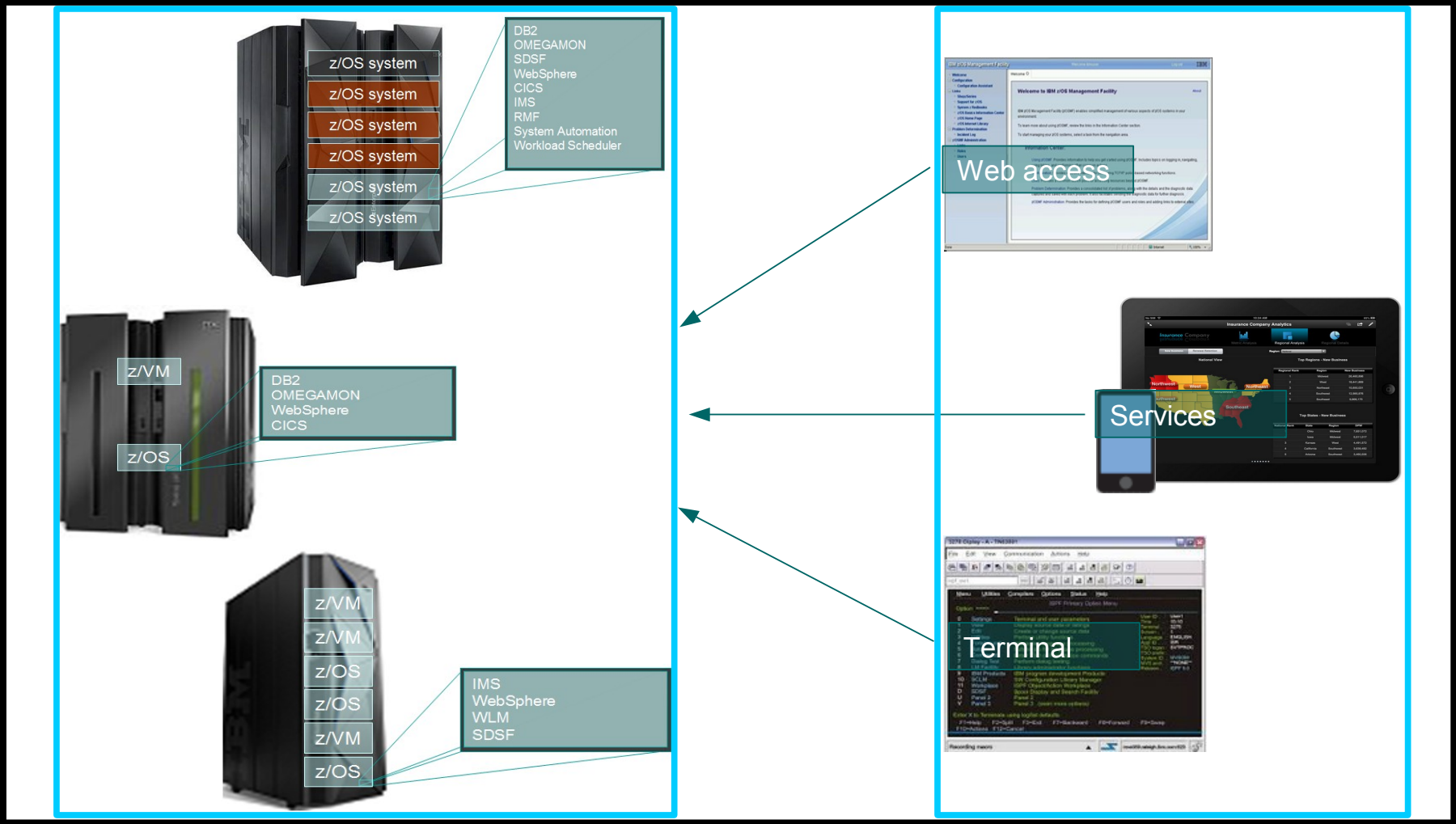
Agenda

- Describe challenge IT shops face when diagnosing and detecting problems
- Introduce IBM zAware
- Demonstrate how to use IBM zAware to detect and diagnose problems
- Summary
- Resources

Background: Complex computing environments (1 of 2)



Background: Complex computing environments (2 of 2)



Problem: Too much message traffic for employees to monitor

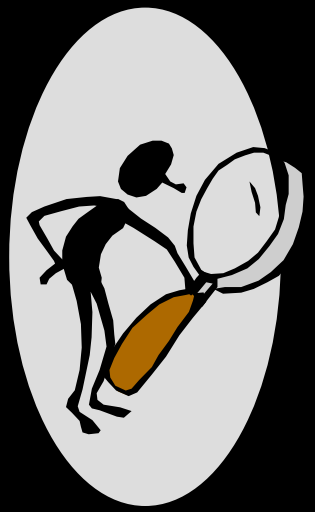
A z/OS sysplex can generate 4GB of message traffic per day for its systems and components.

Solution: IBM zAware

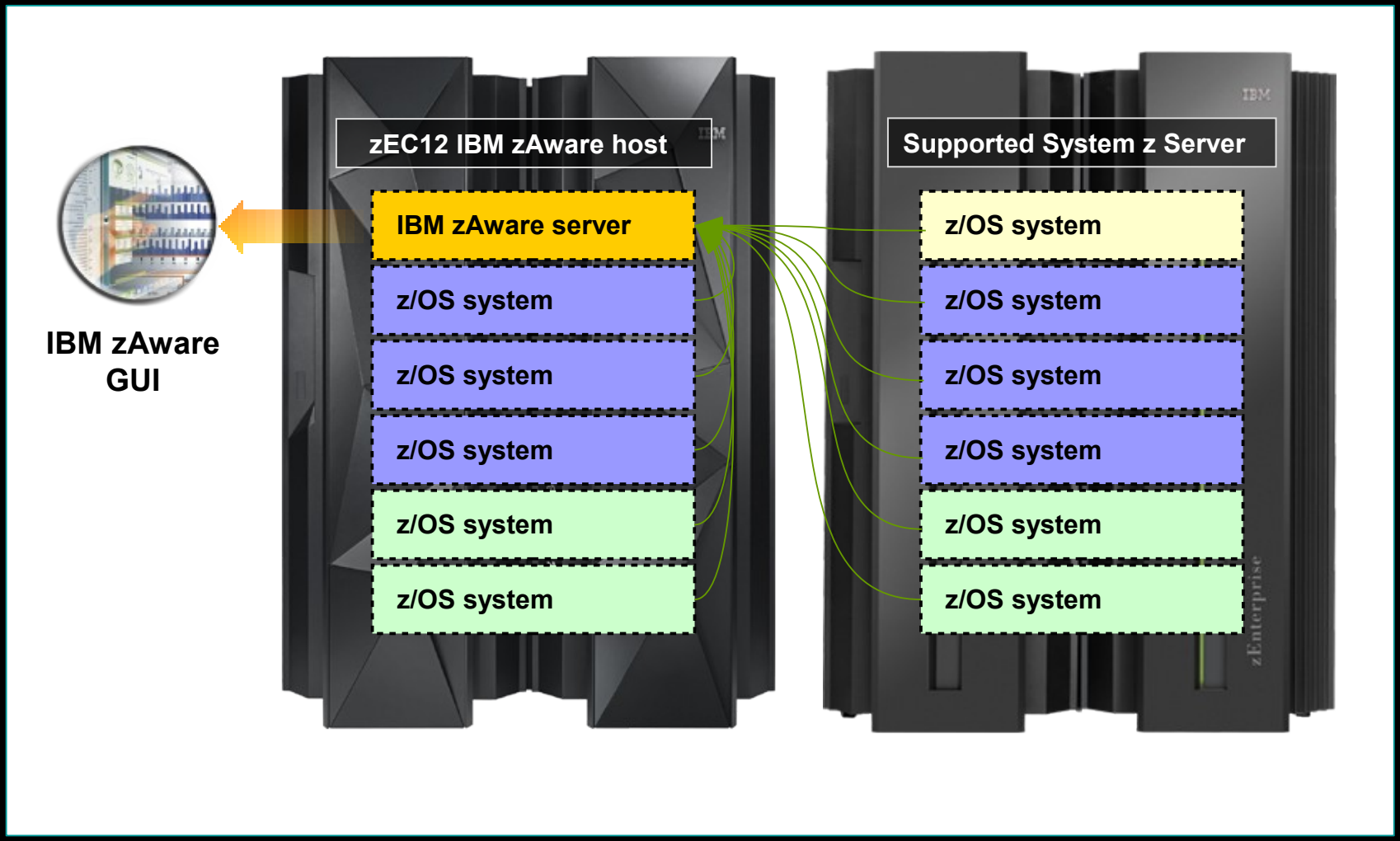
An analytics solution that provides near real-time detection of unusual z/OS system behavior.

IBM System z Advanced Workload Analysis Reporter (IBM zAware):

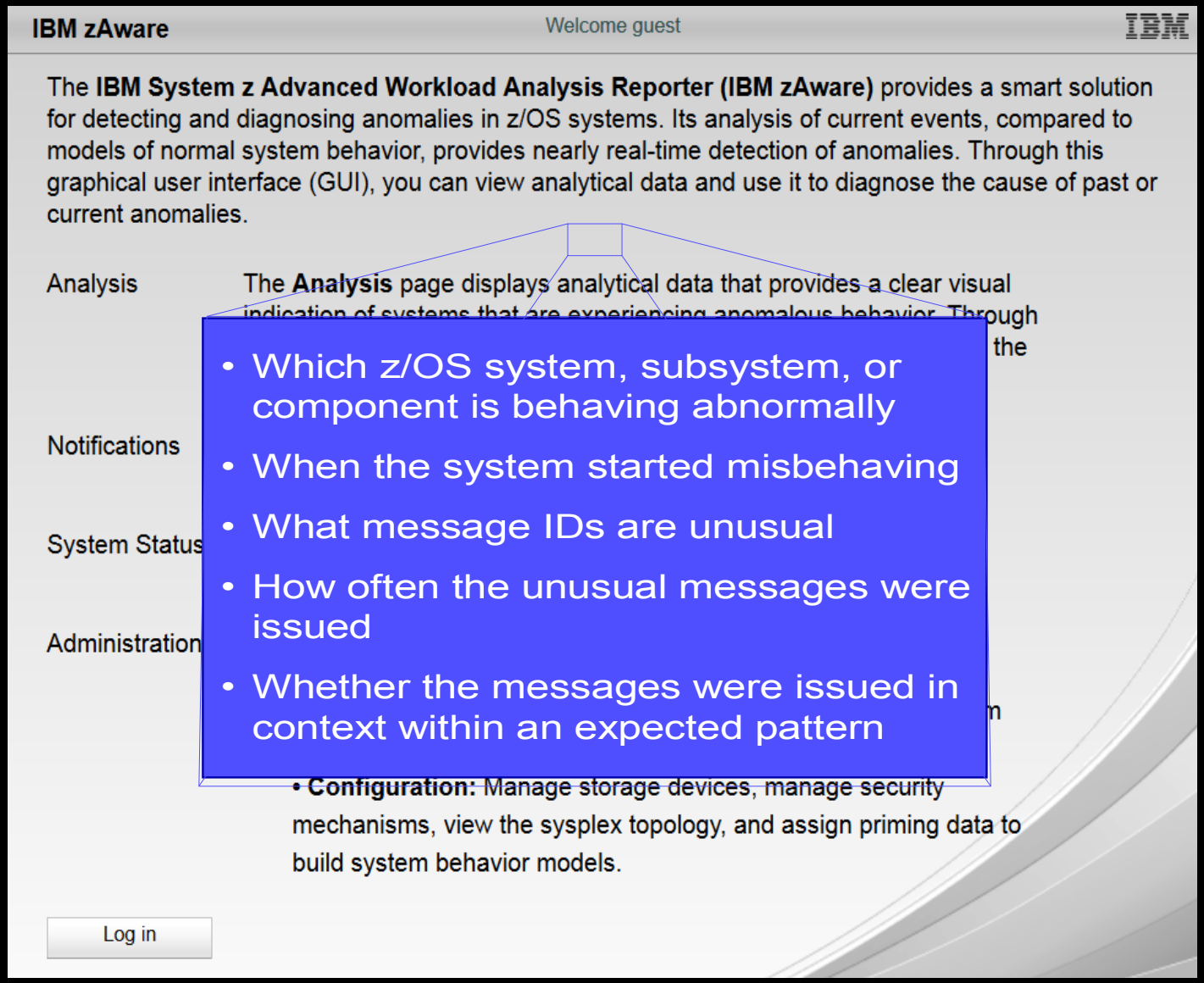
- Builds a model of normal z/OS system behavior
- Compares real-time OPERLOG data to the model
- Pinpoints deviations in normal system behavior
- Provides continuous monitoring of systems running z/OS V1R13 or later
- Improves problem diagnosis across a set of System z servers
- Helps improve time to recovery



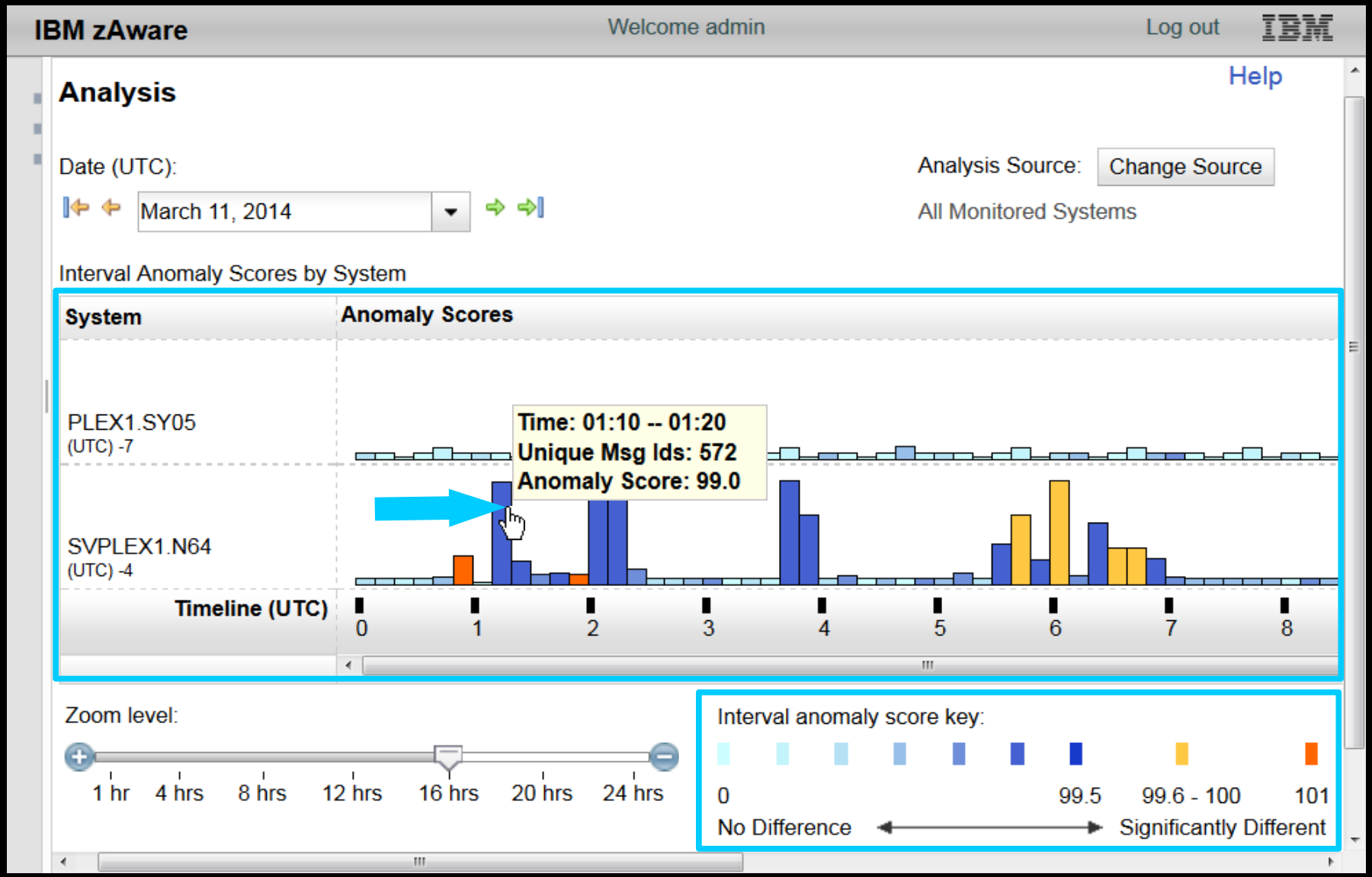
IBM zAware monitored systems



IBM zAware graphical user interface



Analysis page: Quickly identify unusual behavior



Interval view: Drill down to determine the cause of anomalies

Date (UTC): March 11, 2014

Analysis Source: SVPLEX1.N64

Time interval (UTC): 01:10 -- 01:20

Interval anomaly score: 99.0

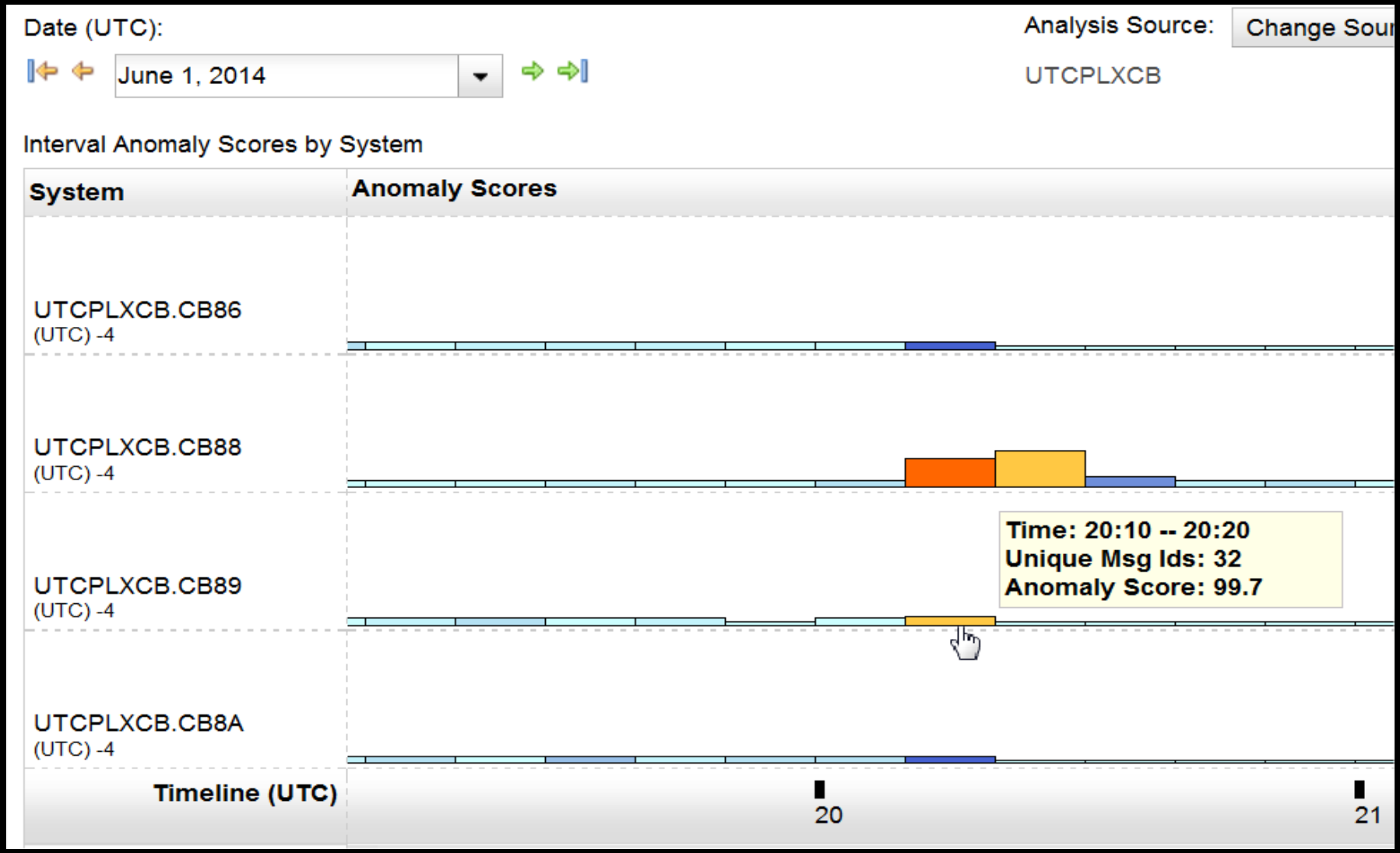
Messages

Actions

▼1 Anomaly Score	Interval ▼2 Contribution Score	Message ID	Message Example	Component
1	5.197	IXC518I	SYSTEM N64 NOT USING COUPLING FACILITY 002097.IBM.02.000000057449 PARTITION: 0E CPCID: 00 NAMED SVT1CF3 REASON: NOT CONNECTED TO SYSTEM. [...] REASON	IXC
0.999	10.662	IEA307I	031E,40, I/O ERROR READING VOLUME LABEL,00,0200,SENSE FOLLOWS.	IEA
0.999	8.582	DSNR007I	-D1P0 RESTART...STATUS TABLE T CON-ID CORR-ID AUTHID PLAN S URID DAY TIME - -------- ------------ -------- -------- - ------------ --- -------- I RRSAF QM64DB2SRV02 SETUP CSQ5U710 C 000FDA8B514C 069	DSNR
0.997	6.441	IOEZ00044I	Aggregate OMVSSPA.SVT.SYSPLEX.ZFS attached successfully.	IOEZ
0.997	6.317	BPXP024I	BPXAS INITIATOR STARTED ON BEHALF OF JOB BPXOINIT RUNNING IN ASID 0035	BPXP

Demo

Between 20:10 and 20:20 on June 1st, multiple systems in sysplex UTCPLXCB received high anomaly scores. Let's dig deeper.

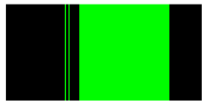
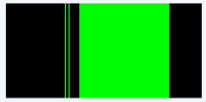
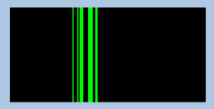
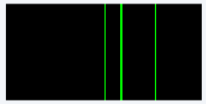
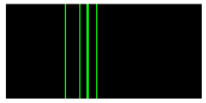
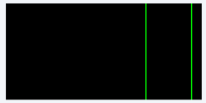


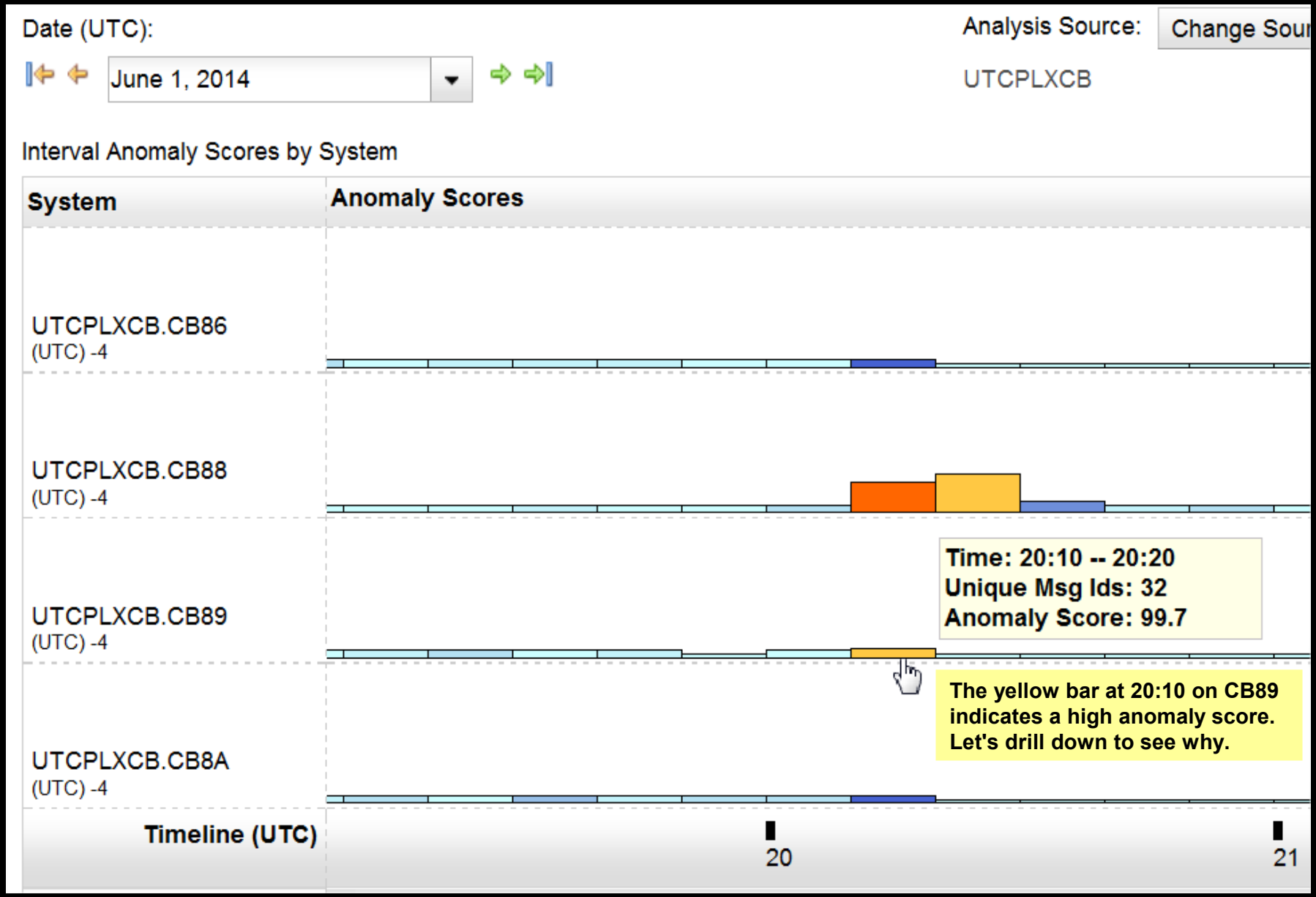
Messages IOS002A & IOS2002I each appeared 97 times and are the highest contributors to the anomaly score. These messages reveal that system CB88 is not connected to storage device 132A, which contains critical system data sets.

IOS002A: The system selected a device for operation. The device did not respond on any online path. The system requires an I/O interrupt to retry I/O requests to the device.

Messages

Actions

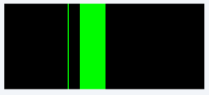
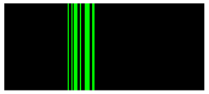
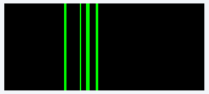
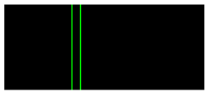
▼1 Anomaly Score	▼2 Interval Contribution Score	Appearance Count	Time Line	Message ID	Message Example		omponent
1	32.795	97		IOS002A	132A,NO PATHS AVAILABLE	101	IOS
1	32.795	97		IOS2002I	132A NO PATHS AVAILABLE STATUS FOR PATH(S) 82,83,86,87 IN PROCESS OF INITIALIZING PATH (B0) NO FURTHER INFORMATION AVAILABLE OR UNKNOWN CONDITION (FF)	101	IOS
1	20.356	20		IOS079I	1343,87,XCFAS, I/O TIMEOUT INTERVAL HAS BEEN EXCEEDED	101	IOS
1	15.516	8		IXC256A	REMOVAL OF PRIMARY COUPLE DATA SET SYS1.COMBAT.SYSP.CDS01 FOR SYSPLEX CANNOT FINISH THE ACTION PHASE UNTIL THE FOLLOWING SYSTEM(S) ACKNOWLEDGE THE REMOVAL: CB8D CB8A	101	IXC
1	14.957	7		IXC253I	ALTERNATE COUPLE DATA SET SYS1.COMBAT.SFM.CDS02 FOR SFM IS BEING REMOVED BECAUSE OF AN I/O ERROR DETECTED BY SYSTEM CB88 ERROR CASE: PERMANENT ERROR	101	IXC
1	14.957	7		IXC263I	REMOVAL OF THE PRIMARY COUPLE DATA SET SYS1.COMBAT.SYSP.CDS01 FOR SYSPLEX IS COMPLETE	101	IXC



Messages IOS002A & IOS2002I appeared 51 times and are the highest contributors to the anomaly score. These messages reveal that system CB89 is not connected to storage device 1324, which contains critical system data sets.

Messages

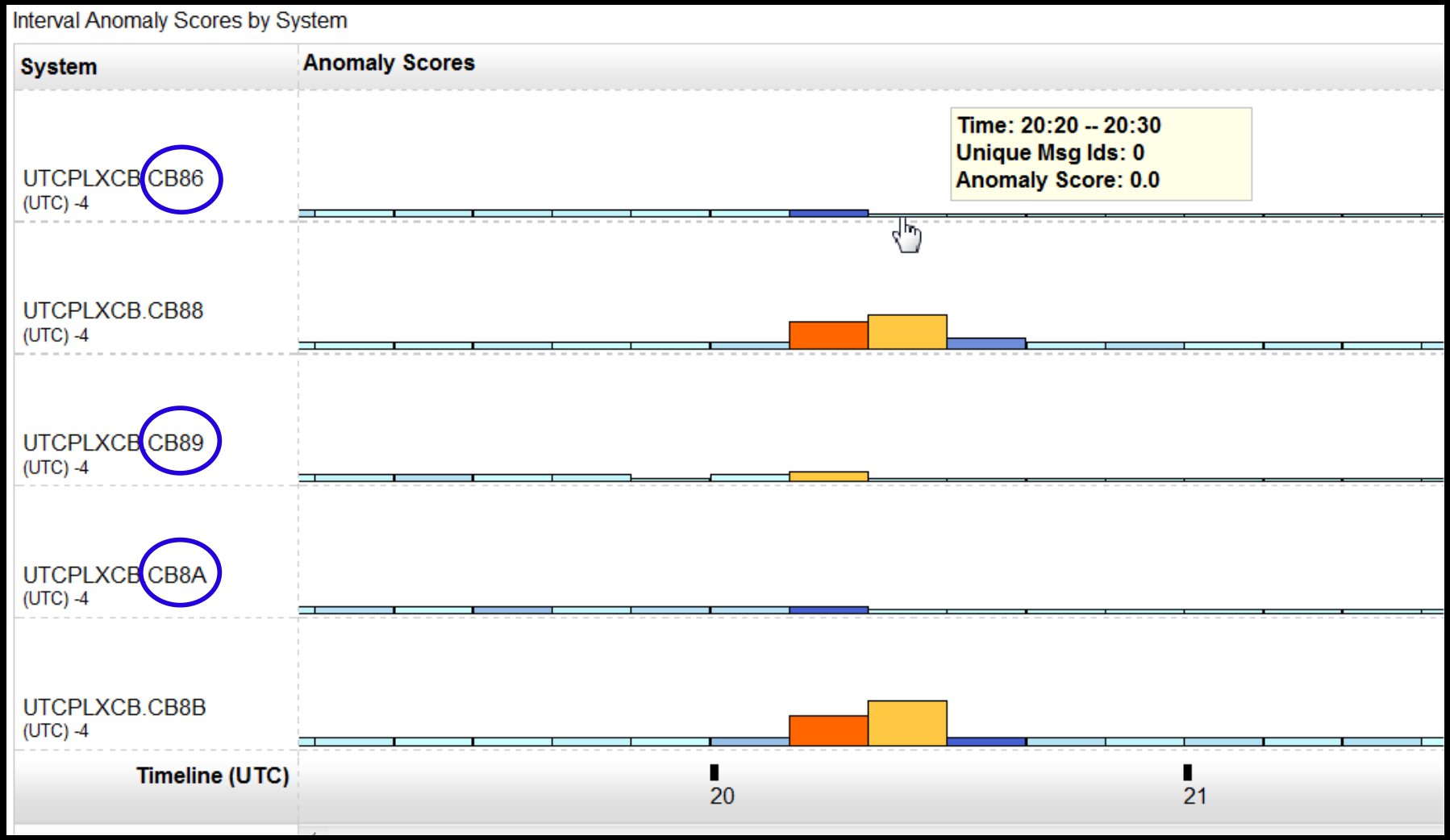
Actions

▼1 Anomaly Score	Interval ▼2 Contribution Score	Appearance Count	Time Line	Message ID	Message Example	Rarity Score	Component
1	26.746	51		IOS002A	1324,NO PATHS AVAILABLE	101	IOS
1	26.746	51		IOS2002I	1324 NO PATHS AVAILABLE STATUS FOR PATH(S) 82,83,86,87 IN PROCESS OF INITIALIZING PATH (B0) NO FURTHER INFORMATION AVAILABLE OR UNKNOWN CONDITION (FF)	101	IOS
1	19.997	20		IOS079I	1343,87,XCFAS, I/O TIMEOUT INTERVAL HAS BEEN EXCEEDED	101	IOS
1	14.598	7		IXC253I	PRIMARY COUPLE DATA SET SYS1.COMBAT.CFRM.CDS01 FOR CFRM IS BEING REMOVED BECAUSE OF AN I/O ERROR DETECTED BY SYSTEM CB89 ERROR CASE: PERMANENT ERROR	101	IXC
1	11.913	3		IOS000I	1343,83,SIM,**,**02,,,CBSYS1,XCFAS	101	IOS

Using IBM zAware, we see that multiple systems have lost connectivity to different storage devices. Investigation beyond IBM zAware was required to determine why connectivity was lost. The investigation concluded an update to the system configuration file removed the paths to the storage devices and that caused the loss of connectivity.

Let's go back to the Analysis panel for one more observation.

The lack of analysis bars for systems CB86, CB89 and CB8A indicates that these systems are no longer connected to IBM zAware. Further investigation uncovers that the systems were unable to recover from the loss of access to the critical system datasets and failed.

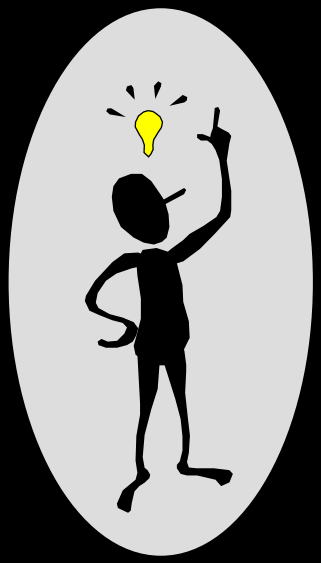


IBM zAware - Smarter monitoring for smarter computing

IBM zAware is a self learning solution that analyzes messages in near real-time to provide insight into the behavior of z/OS systems.

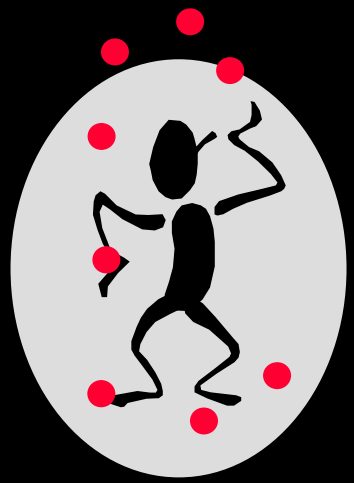
IBM zAware:

- Helps diagnose problems quickly and more accurately to improve service recovery time.
- Reduces risk by identifying “what changed” after maintenance, upgrade, or new product installation.
- Provides an easy-to-use graphical interface that you can use to answer key problem determination questions.



Resources

- Publications:
  - IBM System z Advanced Workload Analysis Reporter (IBM zAware) Guide
  - Extending z/OS System Management Functions with IBM zAware
- Blogs:
  - The Journey to IBM zAware
  - zAware Installation and Startup
  - Top 10 Most Frequently Asked Questions About IBM zAware
- Demo:
  - IBM zAware GUI



Questions