



IBM z/OS Workload Interaction Correlator

IBM z/OS Workload Interaction Navigator

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Agenda

Overview Diagnosing Transient Performance Problems on z/OS

Personas

Correlator Data Generation

Navigator Performance Analysis with demo

Next steps

Performance Testing Overview

Evaluates speed, responsiveness, and stability for anything in a computer for a workload using Key Performance Indicators (KPIs)

- E.g. throughput, response time, and CPU time

Iterative process that:

- Measures workload
- Makes a change
- Measures workload
- Compares KPIs between measurements

Start: simulated, production-like, repeatable workload

End: production, variable workload.

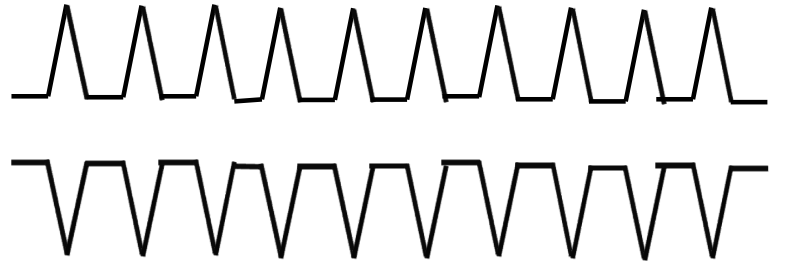


KPI Common Patterns

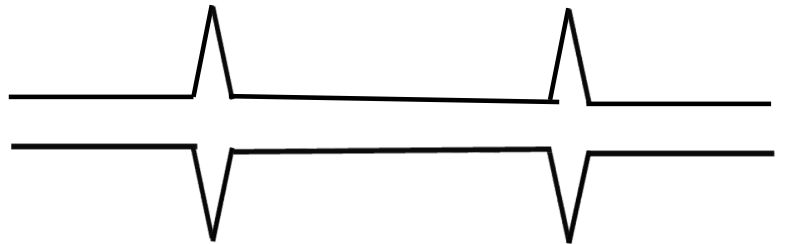
Flat line



Frequent significant peaks or valleys

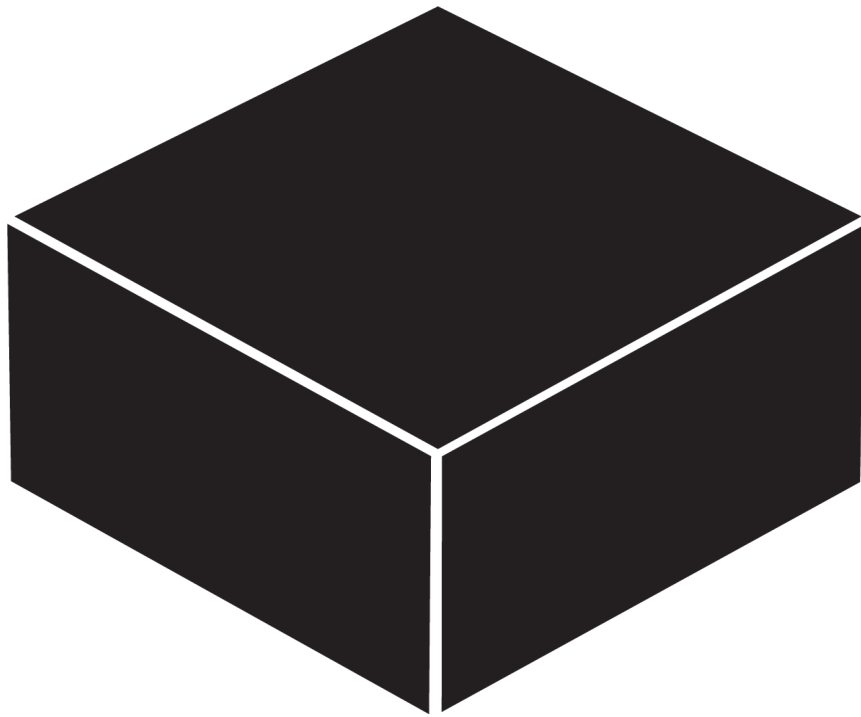


Transient significant peaks or valleys



More frequent data generation sharpens the KPI pattern, but often increases CPU and analysis costs

Challenging detecting and diagnosing transient performance issues



The workload is a black box because its data is:

Noisy

Many workload components generate significant data -- inconsequential to the reported problem

Too Summarized – Overview data (e.g. 15/30 minute interval), averages lose transient issues

Too Detailed – Frequent per event data – cannot see forest for the trees

Siloed

Single-component data generation and analysis - one puzzle piece at a time

Manual cross-silo correlation

Costly

Recreates to collect new data

Detail data requires a lot of CPU and storage to collect and analyze

Requires subject matter experts interpret results

Personas



Addressing transient performance issues improves workload resilience by avoiding workload impacts, crit-sits, and outages when the workload is under more stress.

Tasks, Responsibilities and Key Jobs

- Troubleshooting to ensure smooth operations of their system and that performance meets their business SLAs. Constantly battles against increased workload and performance bottlenecks to minimize operational costs.
- Handles any complex problems that operations team can not directly solve.
- Helps in the automation and creation of runbooks for the resolution to common problems by operations team without his assistance.
- Jim is responsible for the management of one or more key z systems subsystems, such as CICS or IMS. Ensuring applications are deployed correctly and operating to best possible level.
- Jim also performs problem determination when an issue related to system performance is reported to him.
- It's important to Jim to resolve problem as quickly as possible.

Correlator Data Generation

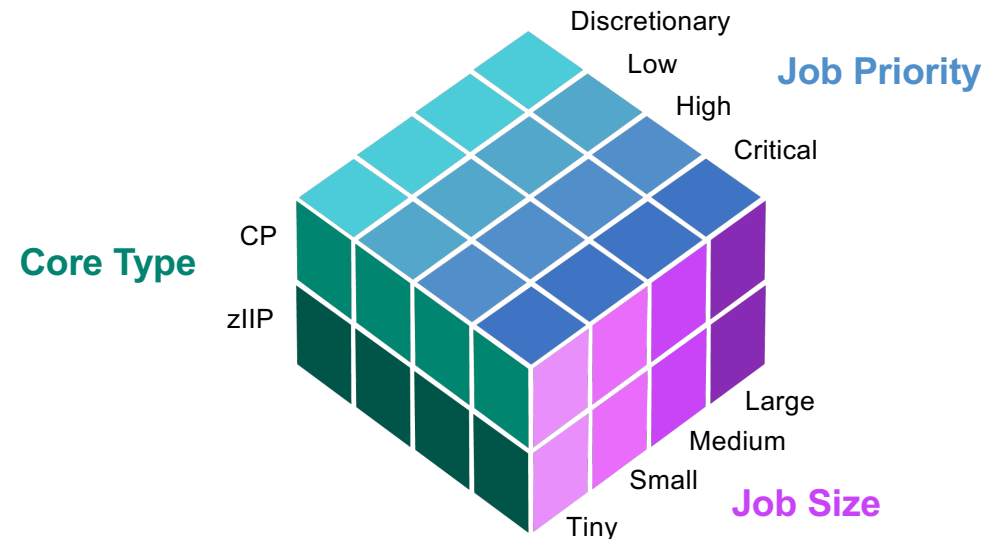
IBM z/OS Workload Interaction Correlator enables z/OS components and middleware silos to generate **5-second** synchronized, **micro-summary**, **exceptionalism enriched data**

Generates data needed to identify and begin diagnosing transient performance issues.

In a variety of IBM z/OS workload benchmark environments, generating **IBM Correlator records did not measurably increase z/OS CPU overhead.**

[Correlator Entitlement](#) allows clients with an RMF license running z/OS 2.4 and above to **generate Correlator records at no additional charge.**

[IBM Flash](#) recommends all clients collect all available Correlator SMF records

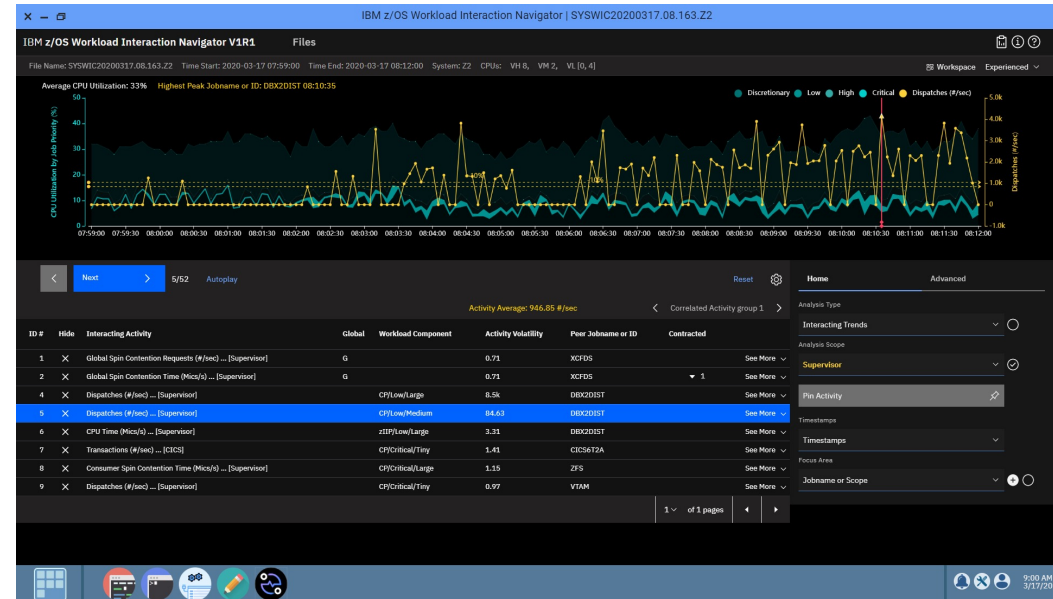


Navigator Reactive Performance Diagnosis



IBM z/OS Workload Interaction Navigator identifies substantive ***client specific anomalies with context***, and temporally correlates them across z/OS and Middleware silos, for a single system and across sysplex members, with ***only 15 minutes*** of Correlator data

Enables Subject Matter Experts to quickly identify correlated anomalies, which **reduces the time required to diagnose workload impacts, crit-sits, or outages.**



Runs as an application in the IBM Z Distribution for Zowe™



Take a test drive with [Navigator zTrial](#)

IBM z/OS Workload Interaction Navigator V1R1

Files

File Name: SYSWIC20200317.08.163.Z2 Time Start: 2020-03-17 07:59:00 Time End: 2020-03-17 08:12:00 System: Z2 CPUs: VH 8, VM 2, VL [0, 4]

Workspace Experienced

Average CPU Utilization: 33% Highest Peak Jobname or ID: DBX2DIST 08:10:35

Discretionary Low High Critical Dispatches (#/sec)

50 40 30 20 10 0 07:59:00 07:59:30 08:00:00 08:00:30 08:01:00 08:01:30 08:02:00 08:02:30 08:03:00 08:03:30 08:04:00 08:04:30 08:05:00 08:05:30 08:06:00 08:06:30 08:07:00 08:07:30 08:08:00 08:08:30 08:09:00 08:09:30 08:10:00 08:10:30 08:11:00 08:11:30 08:12:00

5.0k 4.0k 3.0k 2.0k 1.0k 0 -1.0k

< Next > 5/52 Autoplay

Reset

Activity Average: 946.85 #/sec

< Correlated Activity group 1 >

ID #	Hide	Interacting Activity	Global	Workload Component	Activity Volatility	Peer Jobname or ID	Contracted
1	X	Global Spin Contention Requests (#/sec) ... [Supervisor]	G		0.71	XCFDS	See More
2	X	Global Spin Contention Time (Mics/s) ... [Supervisor]	G		0.71	XCFDS	See More
4	X	Dispatches (#/sec) ... [Supervisor]		CP/Low/Large	8.5k	DBX2DIST	See More
5	X	Dispatches (#/sec) ... [Supervisor]		CP/Low/Medium	84.63	DBX2DIST	See More
6	X	CPU Time (Mics/s) ... [Supervisor]		zIIP/Low/Large	3.31	DBX2DIST	See More
7	X	Transactions (#/sec) ... [CICS]		CP/Critical/Tiny	1.41	CICS6T2A	See More
8	X	Consumer Spin Contention Time (Mics/s) ... [Supervisor]		CP/Critical/Large	1.15	ZFS	See More
9	X	Dispatches (#/sec) ... [Supervisor]		CP/Critical/Tiny	0.97	VTAM	See More

1 of 1 pages

Home Advanced

Analysis Type

Interacting Trends

Analysis Scope

Supervisor

Pin Activity

Timestamps

Timestamps

Focus Area

Jobname or Scope

9:00 AM 3/17/20

Performing Analysis

Single system analysis

- ❖ Single interval analysis
- ❖ Two interval analysis
 - ☐ Compare the intervals between two SMF files.
 - ☐ Compare the same interval with that of last week.
 - ☐ Compare the two intervals within an SMF file.

Sysplex analysis

You can analyze multiple SMF files collected from multiple systems respectively and see the correlated anomalies across multiple systems for single interval in one screen.

Demo

NEW Navigator Inspector Proactive Performance Diagnosis

Navigator Inspector transforms anomalies with context into anomaly signatures over the last 8 weeks and correlates and prioritizes new, reoccurring, and worsening anomaly signatures.

Enables Subject Matter Experts to proactively identify workload anomalies and resilience risks and provide an opportunity to diagnose and address them **before workload impacts, crit-sits, and outages occur.**

The screenshot displays the IBM z/OS Workload Interaction Navigator 1.1.0 interface. The top navigation bar includes the title, a 'Home' link, and a search icon. Below the navigation bar, there's a file name 'SYSDRC20220529.WEEKLY.Z130N...' and time range filters. The main content area features a table of workload anomalies. The table has columns for ID #, Score, Activity Name / Anomaly Signature, Intervals, System, Row, Day, CPU, Highest Peak Time, Highest Peak, Jobname or ID, Activity Average, Date Time, and Workload Component. The table is currently displaying 12 rows of data, with the first row highlighted in blue. The interface also includes a 'Next' button and a 'Workload: All' dropdown menu.

ID #	Score	Activity Name / Anomaly Signature	Intervals	System	Row	Day	CPU	Highest Peak Time	Highest Peak	Jobname or ID	Activity Average	Date Time	Workload Component
AR1	9915	Cpu Time Per Transaction ... [CRCS]	3	Z3	R1	Thu	7(201007)	01:04:45	51 Mics	CRCS015A	5015 Mics	20220804.000900	CPS/Critical/Tiny
AR2	38	Response Time Per Transaction ... [CRCS]	2	Z2	R2	Fri	7(8310000)	11:46:10	368 Mics	CRCS017A	237 Mics	20220729.114400	CPS/Critical/Tiny
AR3	4	Supervisor-Resource-2 ... [Supervisor]	16	Z4	R1	Mon	7(8310014)	11:22:06	323 Mics	CRCS017A	122 Mics	20220729.131400	CPS/Critical/Tiny
AR4	4	Supervisor-Resource-3 ... [Supervisor]	20	Z4				22:44:00	830 Mics	CRCS017A			
AR5	4	Cpu Time Per Transaction ... [CRCS]	2	Z1				17:47:25	2,051 Mics	CRCS017A			
AR6	3	Response Time Per Transaction ... [CRCS]	10	Z2				21:20:15	**	CATALOG			
AR7	2	Cpu Time Per Transaction ... [DPS]	2	Z3				08:20:10	**				
AR8	2	Response Time Per Transaction ... [CRCS]	5	Z1				12:20:10	**				
AR9	2	Response Time Per Transaction ... [CRCS]	4	Z1				02:56:25	**				
AR10	1	Cpu Time Per Transaction ... [DPS]	6	Z3				04:28:00	**				
AR11	1	Cpu Time Per Transaction ... [CRCS]	19	Z3				11:36:35	1068 Mics	CICS00A1A			
AR12	1	Cpu Time Per Transaction ... [DPS]	6	Z4				05:37:40	134 Mics	CICS017A			

IBM z/OS Workload Interaction Navigator V1R1

Files

File Name: SYSWIC20220814.WEEKLY.Z1 ...

Time Start: 20220813.235905

Time End: 20221010.205900

|<

Advancing

>|

<

Next

>

AR1.R1 / 8

Workload: All

Recent: 20221003.20

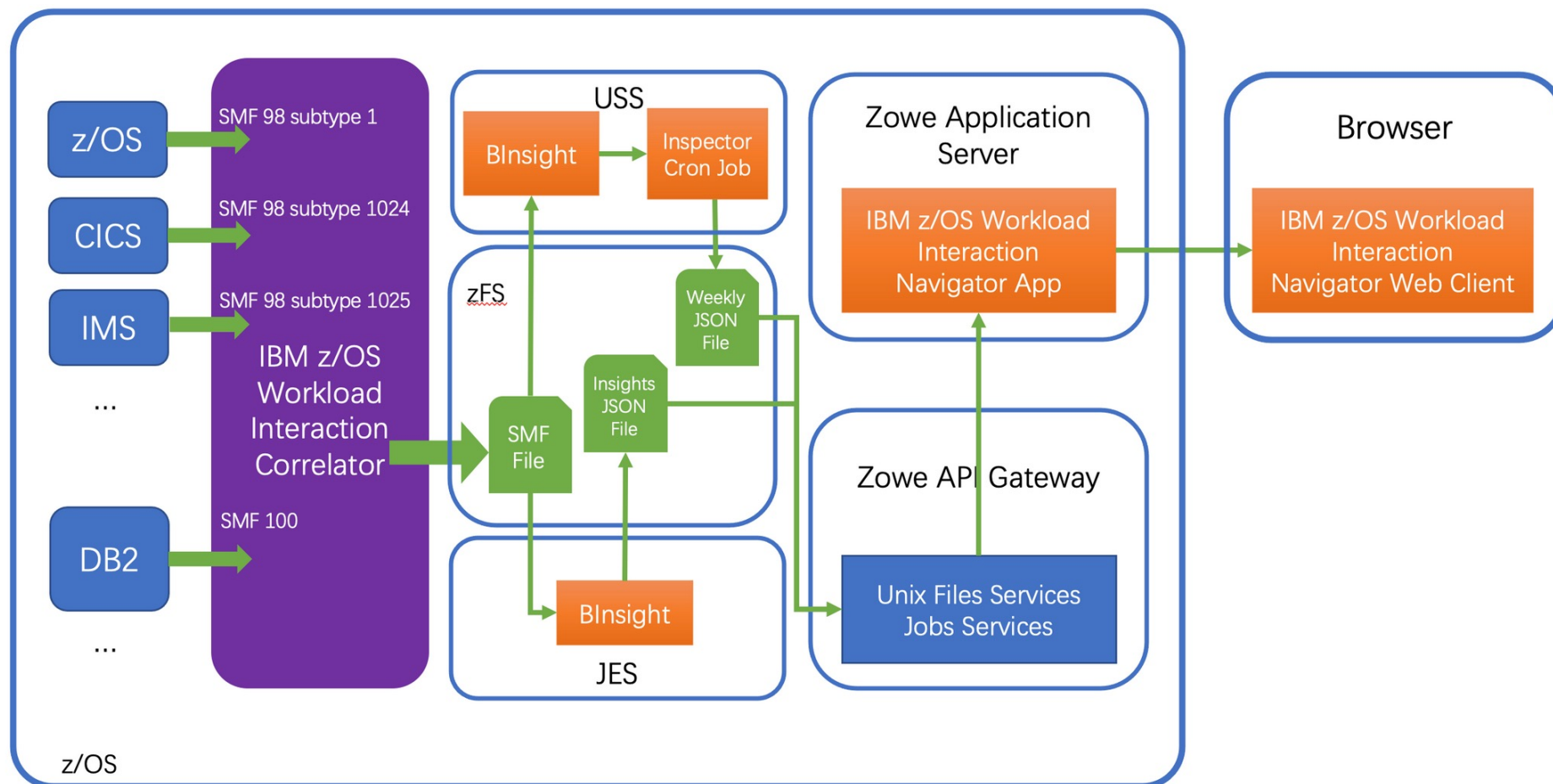
Enable / Remove: Column focus or sort actions ...

Reset

ID #	Score	Activity Name / Anomaly Signature	Intervals	System	Row	Day	CPU	Highest Peak Time	Highest Peak	Jobname or ID	Activity Average	Date Time	Workload Component		
===== Advancing =====															
AR1	692	● Cpu Time Per Transaction ... [CICS] /CP/Critical/CICS6A1A	20	Z1	* R1	Tue	13(38)10(13)	10:20:20	582 Secs	CICS6A1A	5.20 Secs	20221004.101400	CP/Critical/Tiny		
					R2	Tue	13(29)10(4)	02:12:25	2.7k Mics	92 Mics	20221004.015900	CP/Critical/Tiny			
					See More ...			B1	Fri	13(42)10(11)	02:39:20	43k Mics	351 Mics	20220930.022905	CP/Critical/Small
AR2	186	● Response Time Per Transaction ... [CICS]	23	Z1				10:20:45	230k Secs	CICS6A1A					
								14:26:20	420k Mics						
								12:02:40	68 Secs						
AR3	77	● Cpu Time Per Transaction ... [CICS]	11	Z1				13:17:55	253k Mics	CICS2F1A					
								15:27:45	221 Mics						
								00:00:10	212 Mics						
AR4	50	● Cpu Time Per Transaction ... [CICS]	17	Z1				09:50:10	45 Secs	CICS3A1A					
								16:45:30	1.0k Mics						
								04:21:05	70k Mics						
AR5	21	● Cpu Time Per Transaction ... [CICS]	19	Z1				22:29:35	707k Mics	CICSCT1A					
								23:13:20	379k Mics						
								12:16:00	11k Mics						
AR6	20	● Response Time Per Transaction ... [CICS]	40	Z1				11:09:50	245 Secs	CICS2T1A					
								20:24:35	257k Mics						
								10:08:40	5.95 Secs						
AR7	10	● Cpu Time Per Transaction ... [CICS]	3	Z1				10:31:15	42k Mics	CICS3A1A					
								15:03:40	845 Mics						
								13:28:30	2.0k Mics						
AR8	1	● Response Time Per Transaction ... [CICS]	24	Z1				18:20:30	21 Secs	CICS6A1A					
								09:55:50	10 Secs						
								12:56:40	7.64 Secs						
===== Non-Advancing =====															
===== Single-Entry =====															
SR1	**	● (RR) Supervisor-Resource-2 ... [Supervisor]	1	Z1				11:05:10	**	OMVS					
SR2	**	● Supervisor-Resource-1 ... [Supervisor]	1	Z1				12:08:35	**	IOSAS					

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Workload data flow



What can Navigator tell you about your workload?

Contact your IBM Representative to start a “Rapid POC” to:

1. Collect Correlator data from your environment
2. Have IBM experts analyze your Correlator data and playback the results
3. Uncover the power of the Navigator and see what it can do for you

IBM Z Trial

IBM Z Trial

z/OS Workload Interaction Navigator

Welcome to your IBM Z Trial environment. Get started by exploring the scenarios below.

SCENARIO | 30 MINS

Determine the Root Cause of Anomalous CICS Response Time Transactions

Explore scenario

SCENARIO | 30 MINS

Analyze Response Time Increases in CICS and IMS

Explore scenario

SCENARIO | 30 MINS

Find and Analyze Temporally Correlated Anomalies in a Single Sysplex

Explore scenario

Zowe Desktop


←

→

↺

🏠

https://zwinserver:8544/ZLUX/plugins/org.zowe.zlux.bootstrap/web/



OPEN MAINFRAME PROJECT

Username

Password

Login

v. 1.13.0+20200623

Overview

File Edit View Window

☰

Overview

Use the z/OS® Workload Interaction Navigator to analyze Correlator data and diagnose a workload performance problem.

The z/OS Workload Interaction Navigator provides a single interface to analyze, temporally correlate, prioritize, and visualize anomalous activities across the z/OS stack by using z/OS Workload Interaction Correlator data.

In this scenario, in the role of a performance analyst, you have a background about your environment. You recognize the job names of middleware and running applications. For example, you can recognize that CSWAA115 is a CICS® region name and DWB1DBM1 is a Db2® subsystem.

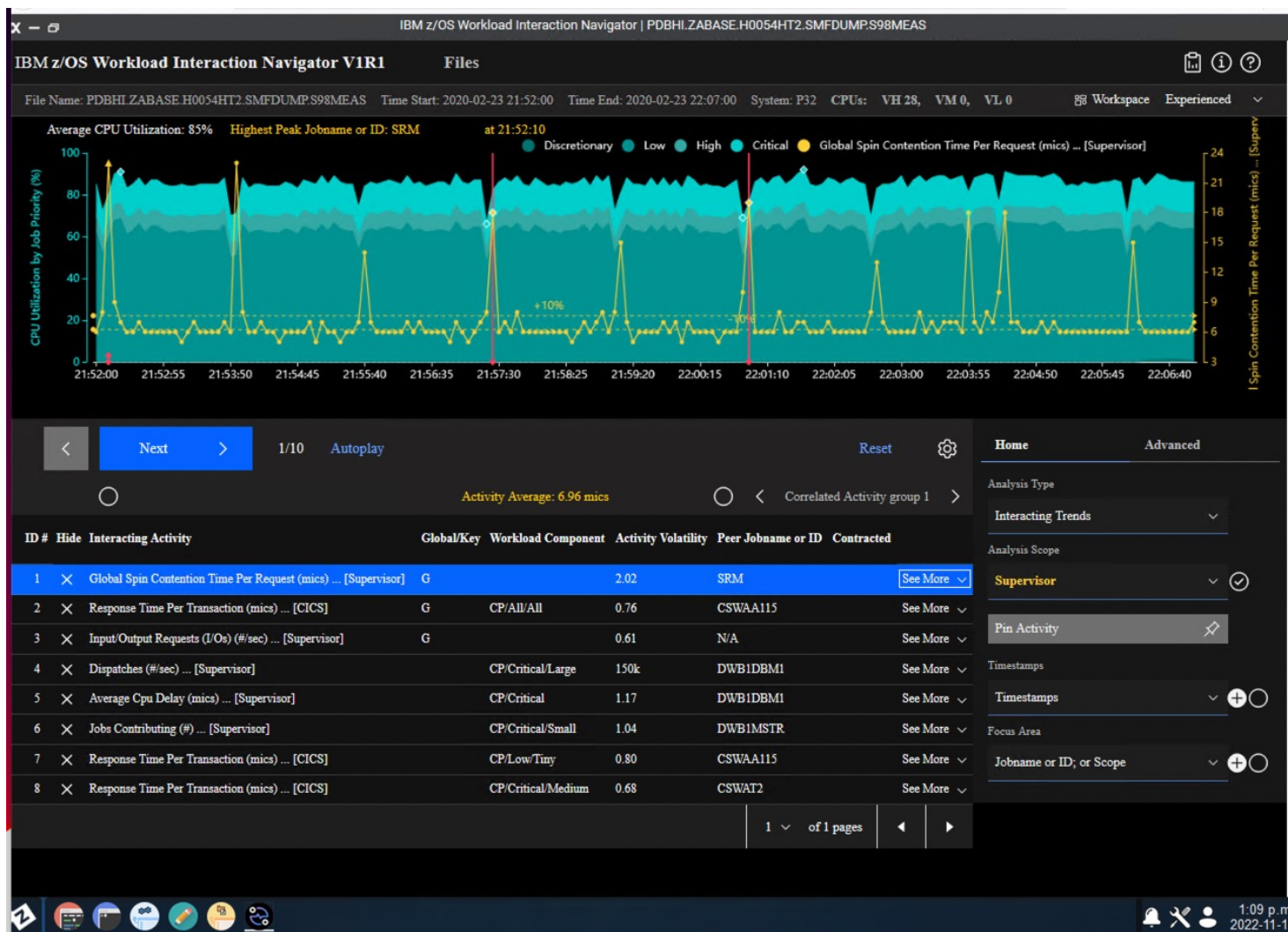
For an IBM® benchmark, a problem was reported that in a 15-minute Resource Measurement Facility (RMF) interval, 5% of the transactions had a response time 2 times larger than the other 95% of the transactions. Analysts were unable to determine the root cause by looking at the RMF data alone since RMF data is highly summarized and not suitable for diagnosing transient performance issues.

Please wait a moment for your development environment to load. When it loads, locate the navigation bar that is labeled "Accessing Correlator Data" on this page. Click this bar to move to the next section.

During the scenario, Zowe™ desktop can time out due to inactivity. If you get disconnected, log in to Zowe desktop and you will resume from where you left off. Also, note that the Z Trial instructions might cover some content during the scenario. Move or minimize the instructions if needed. The Z Trial icon on the windows menu bar will restore the instructions after it is minimized.

Proceed when Zowe desktop loads.

Next



Analyzing Interacting Activities

As a performance analyst, you determine the root cause of the problem symptom by analyzing Interacting Activities.

Remember the problem symptom:

A problem was reported that in a 15-minute RMF interval, 5% of the transactions had a response time 2 times larger than the other 95 of the transactions.

Your goal as a performance analyst is to determine the cause of the increase in response times. To determine the cause, you need to analyze some Interacting Activities.

Note: All questions have answers provided - try to not read the answers before you think about the solution.

- If **Interacting Activity ID #1** is not already clicked, click it.

Automated Analysis chose Interacting Activity ID #1 as the first activity because it is the most important activity.

Interacting Activities are graphed by the solid yellow line. The red vertical line or lines that pass through the peak or peaks are why this Interacting Activity is included in this Correlated Activity Group.

The Navigator uses a patented algorithm to determine which peaks are anomalous.

Interacting Activity ID #1 is **Global Spin Contention Time Per Request**. This metric tracks the average spin time per contention request workload-wide and it reports the worst offending Spin Lock name at each interval.

References

- [IBM Flash Recommends All Clients Collect All Available Correlator records](#)
- [IBM z/OS Workload Interaction Correlator Announce](#)
- [IBM z/OS Workload Interaction Correlator Entitlement Announce](#)
- [IBM z/OS Workload Interaction Navigator Announce](#)
- [IBM z/OS Workload Interaction Navigator Marketplace](#)
- [IBM Systems Magazine: Improve Workload Resilience With z/OS Workload Interaction Correlator and z/OS Workload Interaction Navigator](#)
- [Navigator Whitepaper](#)
- [Correlator / Navigator Introduction Video](#)
- [Navigator Single Interval Demo](#)
- [z/OS Workload Interaction Navigator zTrial](#)
- [Navigator Knowledge Center](#)

Questions?

