

z/OS V2.5 IBM Education Assistant

Solution Name: Correlator and Navigator

Solution Element(s):

IBM z/OS Workload Interaction Correlator: z/OS BCP, CICS, IMS

IBM z/OS Workload Interaction Navigator

July 2021



Agenda

- Trademarks
- Objectives
- Overview
- Solution Demonstration
- Interactions & Dependencies
- Upgrade & Coexistence Considerations
- Installation & Configuration
- Appendix

Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.
- Additional Trademarks:
 - None

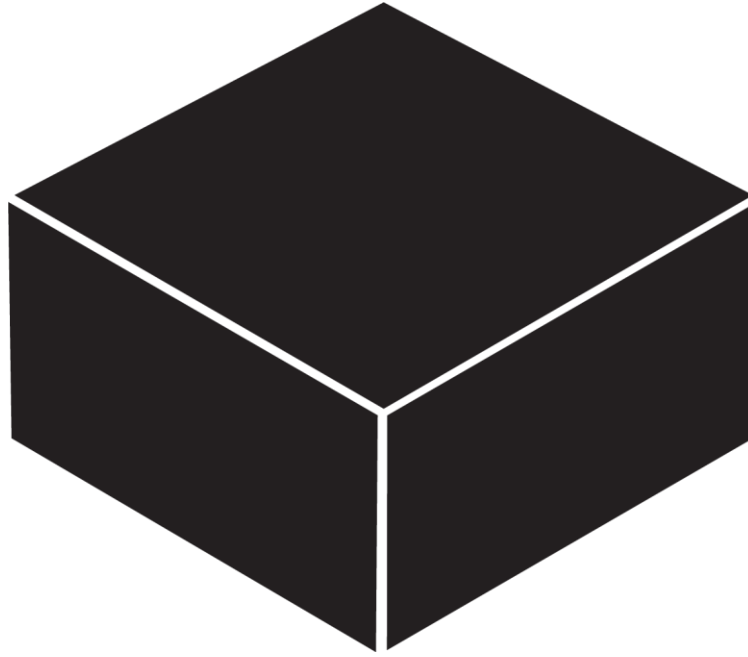
Objectives

- Describe challenges in diagnosing z/OS workload performance problems
- Share IBM z/OS Workload Interaction Correlator and its new data generation paradigm
- Promote z/OS Workload Interaction Navigator analysis of new data
- Demonstrate these technologies using lab data
- Connect the presenters with clients interested in these technologies

Overview

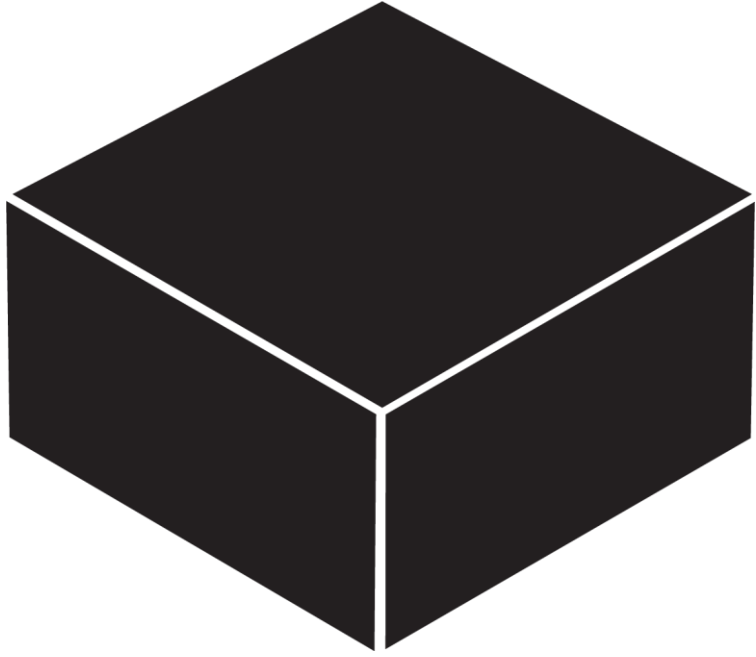
- Who (Audience)
 - A Subject Matter Expert (SME)
- What (Solution)
 - analyzing z/OS Workload Interaction Correlator data through the IBM z/OS Workload Interaction Navigator
- Wow (Benefit / Value, Need Addressed)
 - can implicate and exonerate workload components and their activities and reduce the time required to diagnose the root cause of a z/OS workload performance problem.

Analyzing Workloads Today



The IBM Z workload is a black box...

Challenges Diagnosing Workload Performance Issues



Data is the biggest challenge in analyzing the workloads running on IBM Z....

Data is Costly

Data collection requires significant CPU and storage to collect and analyze data

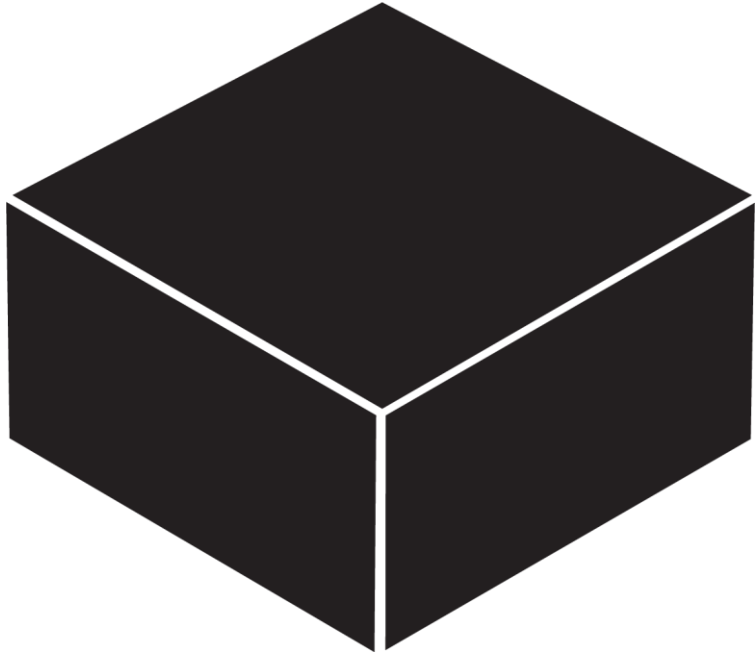
Data is Siloed

Single-component data generation only gives one puzzle piece at a time resulting in manual data correlation

Data is Noisy

Significant data generation is often too detailed resulting in data that is inconsequential to the reported problem

Resource Management Facility Data (RMF)



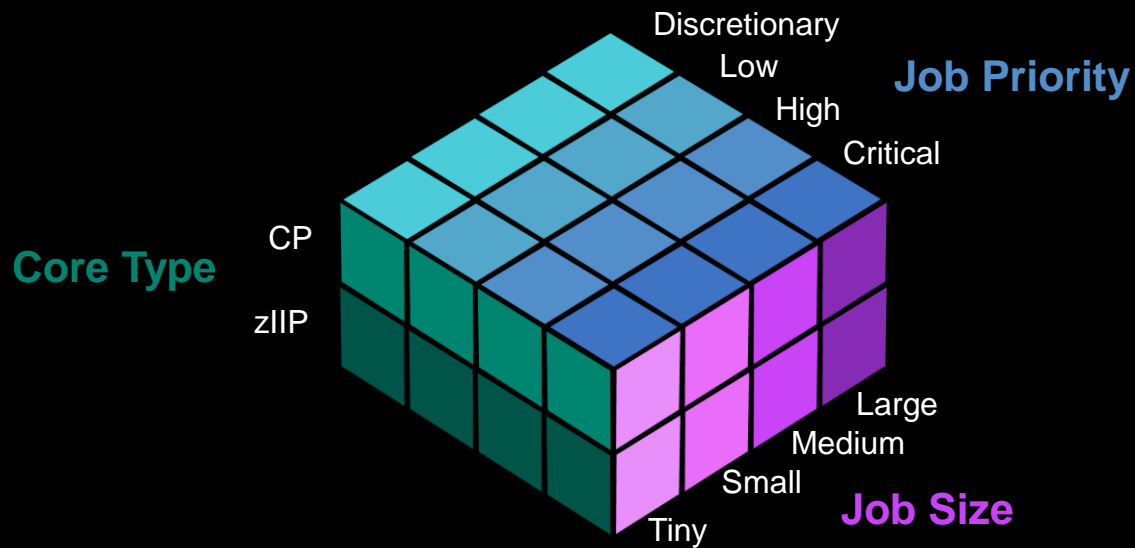
What about RMF Data?

While RMF data is extremely valuable, it alone is not sufficient for identifying root cause of operational issues in real time.

Infrequent sampling at an average of 15 minute intervals provides only an overview, missing transient issues in workloads.

Historical reporting of z/OS workload requirements and hardware resource utilization - value is for long term system performance and capacity planning.

IBM z/OS Workload Interaction Correlator



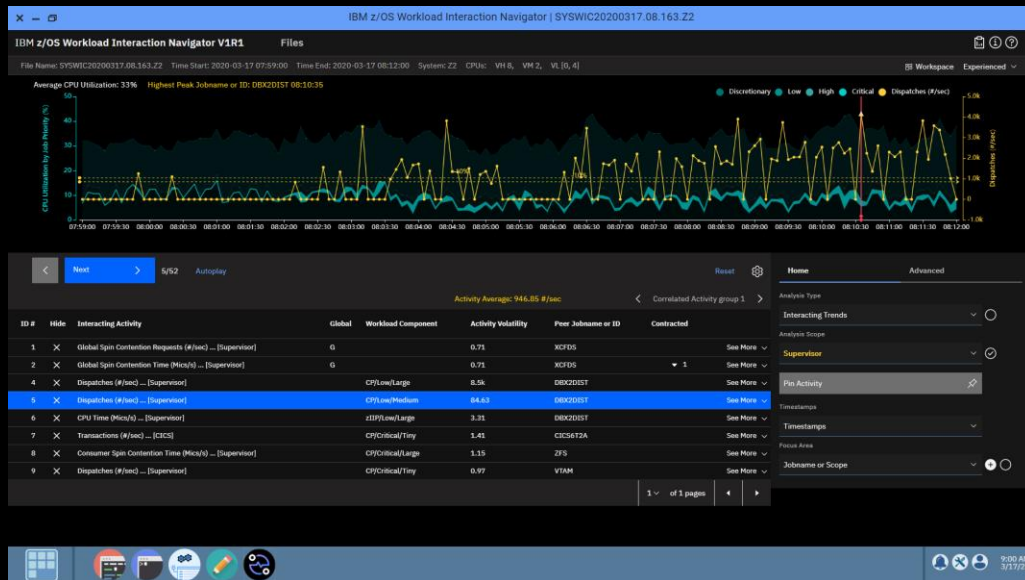
Generate
Standardized,
Synchronized, Smarter
Data every 5 seconds -
high value data with
low generation cost.

Time sequenced
short interval
summary data
enables analytics to
establish interval
activity baselines for
the purpose of
anomaly detection.

Enable entire z/OS and
middleware **stack**
analysis through
a **common**
analytics engine.

Organize workload into
cubes by software
stack dimensions
including core type, job
size, and job priority.

IBM z/OS Workload Interaction Navigator



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



A single interface to analyze Workload Interaction Correlator data. The Navigator correlates and recognizes multi-domain anomalous activity with cross-sectional views with exceptional job detail per cube.

Dynamically recognize anomalies in a single time interval. Anomalous activities are **temporally correlated and contextually prioritized** to present only the most impactful issues.

Cause and victim relationships can be visualized across disparate activities – **reducing root cause identification time.**

Directly comparing the activities across two intervals enables the ability to identify differences, providing **validation that workload / software changes have the desired effect.**

Anomaly Detection – Two different but complementary solutions

IBM z/OS Workload Interaction Navigator

IBM Z Operations Analytics

Creates an environment model by analyzing a large period of historical data.

Creates a baseline by analyzing a short, time boxed data set (e.g. 15 minutes).

Detects anomalies by scoring real time data against a historical model.

Detects anomalies on demand by analyzing data over a short time interval.

Anomalies can be used to understand trends and forecast potential issues.

Anomalies can be used to correlate short term deviations across the workload to identify root cause.



Interactions & Dependencies

- Software Dependencies
 - IBM z/OS Workload Interaction Correlator requires:
 - S018H13 – IBM z/OS Workload Interaction Correlator (MLC Priced Feature)
 - SMF Logstreams
 - IBM z/OS Workload Interaction Navigator requires:
 - 5698-WKN - IBM z/OS Workload Interaction Navigator (OTC Priced Solution)
 - IBM Z Distribution for Zowe V1.0.0 or above
 - IBM SDK for Node.js Version 8 or above
 - IBM SDK for z/OS, Java Technology Edition, Version 8
- Hardware Dependencies
 - IBM z14 or IBM z15
- Exploiters – Correlator data: Volume – consistent, Size – depends on config and workload
 - Supervisor – Estimate 1 record every 5 seconds, ~32k bytes per record, ~22M per hour, ~550M per day
 - CICS – Estimate 1 record every 5 seconds, ~2k bytes per record, ~1.5M per hour, ~35M per day
 - IMS – Estimate 1 record every 5 seconds, ~2k bytes per record, ~1.5M per hour, ~35M per day

Upgrade & Coexistence Considerations

- To exploit this solution, all systems in the Sysplex must be at the new z/OS level:
No
- No Other Considerations

Installation & Configuration

- APARs needed for enablement:
 - IBM z/OS Workload Interaction Correlator – for any system generating Correlator data:
 - z/OS 2.5 – No APARs needed
 - z/OS 2.3 and 2.4 -- APARs OA57165 and OA60372
 - CICS 5.4 or later -- APAR PH16392, PH30291
 - IMS 15 -- APAR PH15062, PH29306
 - IBM z/OS Workload Interaction Navigator
 - 1.1.0 -- APARs OA59775, OA60478

Installation & Configuration – Correlator

- Activate z/OS priced feature via SYS1.PARMLIB(IFAPRDxx):
PRODUCT OWNER('IBM CORP')
NAME('z/OS')
ID(5650-ZOS)
FEATURENAME(WorkloadIntCorr)
STATE(ENABLED)
- Configure Correlator in SMF via SYS1.PARMLIB(SMFPRMxx) keywords:
 - WIC – activates Correlator – Enables registration, data generation (with priced feature)
 - NOWIC – deactivates Correlator – Disables registration, disables data generation
 - TYPE(98) – collect SMF 98s
 - INMEM(IFASMF.WIC,RESSIZMAX(2G),TYPE(98)) – Send SMF 98s to IFASMF.WIC in-memory resource
- Generally, doing above steps in any order generate Correlator data. Exception is:
 - To generate IMS Correlator data, Correlator registration must be active (SMFPRMxx WIC) during IMS control region initialization – If not, must recycle IMS to generate data.

Installation & Configuration – Correlator

- Create a separate zFS for each system to write its SMF 98s
 - Sysplex -- mount a read/write, sysplex-aware zFS with high availability and AUTOMOVE via:
 - MOUNT FILESYSTEM('OMVS.WIC.*sysname*.ZFS') TYPE(ZFS) MODE(RDWR) AUTOMOVE(INCLUDE,*) PARM('RWSHARE,HA') MOUNTPOINT('/global/wic/*sysname*')
 - Non-sysplex -- mount a non-sysplex aware read/write zFS
 - MOUNT FILESYSTEM('OMVS.WIC.*sysname*.ZFS') TYPE(ZFS) MODE(RDWR) UNMOUNT PARM('NORWSHARE') MOUNTPOINT('/global/wic/*sysname*')
- Configure HIS to read from in-memory object and write to zFS via command
 - MODIFY *hisproc*,WIC,INMEM=IFASMF.WIC,WICPATH='/global/wic/*sysname*'
- See <http://ibm.biz/EnablingCorrelator> for more information

Installation & Configuration – Navigator

- Increase Zowe UNIX files service heap size to 1024M or larger
- Run Navigator config.sh script to configure Navigator
- Run Zowe script to install Navigator plug-in
- Restart Zowe
- Under Zowe start menu, choose Navigator
- See [Navigator Config](#) for more information

A Parting Recommendation...

- Correlator generalizes High Frequency Throughput Statistics (HFTS) infrastructure
 - Enables other z/OS components and middleware to more easily generate Correlator data
- z/OS Supervisor (SMF 98 subtype 1) is the only exploiter of HFTS -- can be generated without the Correlator priced feature
- For transient, cross-stack crit-sits, IBM has been requesting z/OS Supervisor HFTS data (SMF 98 subtype 1) for problem diagnosis
 - It's low CPU cost, high value data that helps IBM diagnose root cause faster
 - Data generation size is config & workload dependent -- Estimate ~22M per hour, ~550M per day
- [April 2021 IBM Flash](#) recommends always collecting:
 - [z/OS Hardware Instrumentation Services \(HIS\) hardware counters](#) – makes HFTS more valuable
 - z/OS Supervisor HFTS data via [SYS1.PARMLIB\(SMFPRMxx\)](#) keywords:
 - [HFTSINTVL\(5\)](#) – sets 5 second HFTS data generation
 - TYPE(98) – collects SMF 98s

Summary

IBM z/OS Workload Interaction Correlator

Smart, low cost, time sequenced summary data enables automated detection of anomalous behavior from multi-domain activities.

Improve workload availability by providing a method to validate changes to the environment have the desired effect.

IBM z/OS Workload Interaction Navigator

Enable subject matter experts to quickly determine the cause and victim relationship across the IBM Z software stack by gaining visibility into the interdependencies and interactions across workloads.

Appendix

- [Navigator Announce](#)
- [Correlator Announce](#)

- [Navigator Product Page](#)
- [Navigator System Magazine Article](#)
- [Navigator Whitepaper](#)

- [IBM Z Content Solutions: z/OS Workload Interaction Correlator](#)
 - [Enabling Workload Interaction Correlator](#)
- [IBM z/OS Workload Interaction Navigator V1.1.0 Documentation](#)
 - [Configuring](#)

- [April 2021 IBM Flash Recommending Collecting SMF 98s](#)