Runtime Metrics Collection Update
Operations and Coverage

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IBM Z

IBM

Agenda

PJ46982 (Aug 2023) Starter Kit Installation on Linux on IBM Z

PJ46904 (Aug 2023) User-defined Metrics

Future

- CDC Dashboards

- Roadmap

PJ46982 (Aug 2023) Starter Kit Installation on Linux on IBM Z

As-Is:
- Your administrator had to modify the starter kit Docker definitions to make things work for Linux® on IBM Z®.
- Further, your administrator had to find or build open source component images for Linux® on IBM Z®.

To-Be:
- Your administrator sets a flag and the starter kit installation works for Linux® on IBM Z® without modifications.
- Most open source images for Linux® on IBM Z® are built and supplied by IBM, the remainder of which you should obtain from a local or trusted repository.

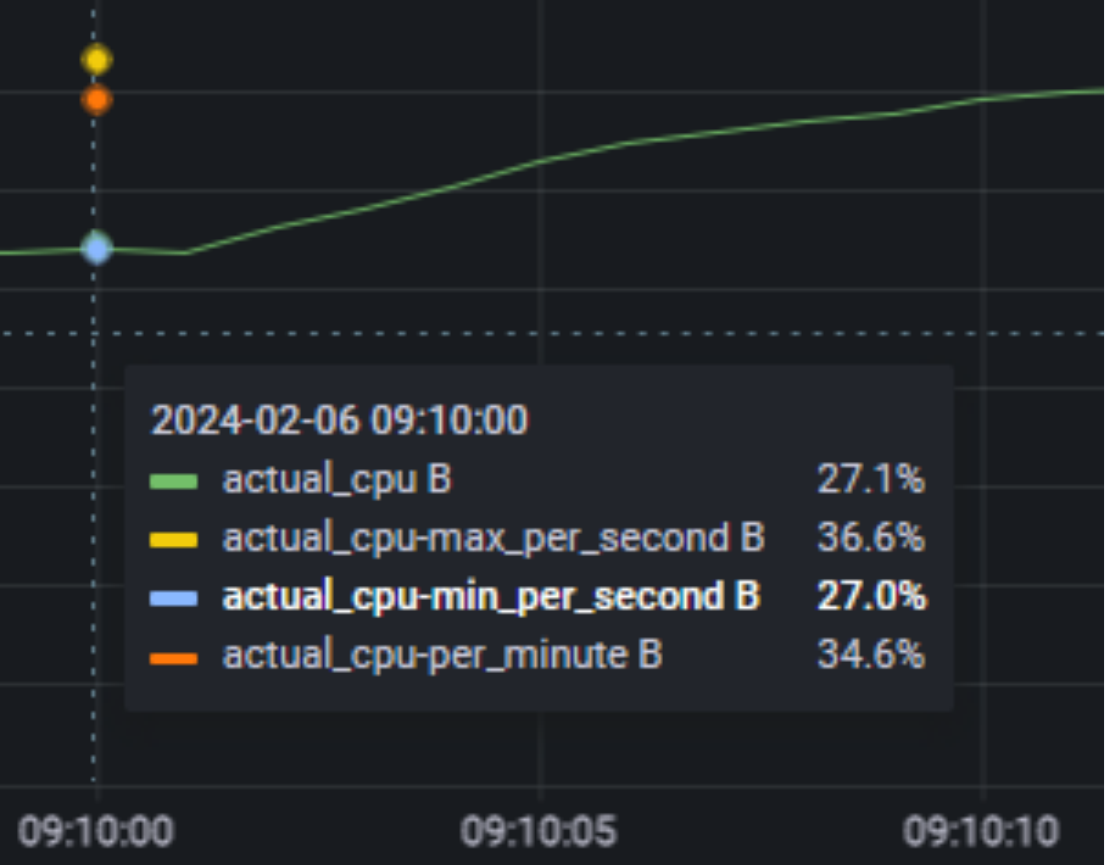# PJ46982 (Aug 2023) Starter Kit Installation on Linux on IBM Z - Details

- Provides a Docker configuration for you to install the z/TPF real-time insights dashboard starter kit on Linux® on IBM Z®.
- Installation on Linux® on IBM Z® uses the IBM Z and LinuxONE Container Registry for most of the open source dependencies, the remainder of which you should obtain from a local or trusted repository. This provides an additional layer of security. [Container Images for IBM Z and LinuxONE](#)

PJ46982 (Aug 2023) Starter Kit Installation on Linux on IBM Z - Details

- Additional enhancements included with this APAR:
  - Easy to configure installation from trusted or local repositories.
  - Installing with a specified user ID instead of root.
  - IBM® Semeru Runtime Open Edition 11 (that is, Java 11) support for the tpfrtmc offline utility, tpf_zmatc_analyzer offline utility, and z/TPF real-time insights dashboard starter kit.
  - Sample data pruning.
    - Max, min, average per second calculated on minute boundary.
    - Per second data and all data deleted on specified day boundary.
  - All name-value pair collection metrics are available by default on name-value pair dashboards. This includes default configurations, table definitions, python processing, and pruning.

PJ46982 – Sample Pruning Metrics

Screenshot shows the ZRTMC Complex-Wide Results > 01. System State dashboard with max, min, per_minute "Metric Variations" selected and the per second, max, min, and per minute actual_cpu "Metrics" selected.

2024-02-06 09:10:00

🟢	actual_cpu B	27.1%
🟡	actual_cpu-max_per_second B	36.6%
🔵	**actual_cpu-min_per_second B**	**27.0%**
🟠	actual_cpu-per_minute B	34.6%

09:10:00   09:10:05   09:10:10

PJ46982 – All Name-value Pair Metrics

Screenshot shows the ZRTMC Complex-Wide Results > 02. Name-Value Pair Metrics dashboard with all "Metric Types" selected such that the "Metrics" variable shows all 67 available name-value pair collection metrics.

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PJ46904 (Aug 2023) User-defined Metrics

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PJ46904 (Aug 2023) User-defined Metrics

As-Is:

- You have time-initiated messages that print various metrics to your console.
- At the end of the day, you process the console, screen scrape the data and extract, transform and load these metrics into databases for analysis.
- Problem detection, problem resolution, and business metric analysis is painful and takes a long time just to see the data.

To-Be:

- You send system (proprietary API counts), application (remote call timeout rate, error rates), and business (sales, reasons for authorization decline) metrics through runtime metrics collection for real-time monitoring and AI analysis.

PJ46904 (Aug 2023) User-defined Metrics

- Online changes can be minimal:
  - Modify your existing z/TPF code that generates the time-initiated messages that print various metrics to your console.
  - Define DFDL file to describe your binary structure or DSECT. No hard limit on the number of metrics you can send.
  - Call DFDL library to convert binary data to JSON.
  - Call RTMC send API specifying your data type. No hard limit on the number of data types you can define.
- Offline changes:
  - Create dashboards and SQL, define tables, minimal python.

Not intended for sending log or individual transaction data.
Ideal for summary level metrics similar to CDC system metrics.

PJ46904 (Aug 2023) User-defined Metrics

Tutorial walks through **<u>ALL</u>** aspects of implementing user-defined metrics:

- Online collection, DFDL handling to convert to JSON, and calling the z/TPF user-defined metrics send API.
- Offline tables definitions, tpf_zrtmc_analyzer python coding, Grafana dashboard and associated SQL.
- Fully working tutorial example included with the starter kit (online and offline code).

https://www.ibm.com/docs/en/ztpf/latest?topic=metrics-user-defined-tutorial

User-defined Metrics Sample Dashboard
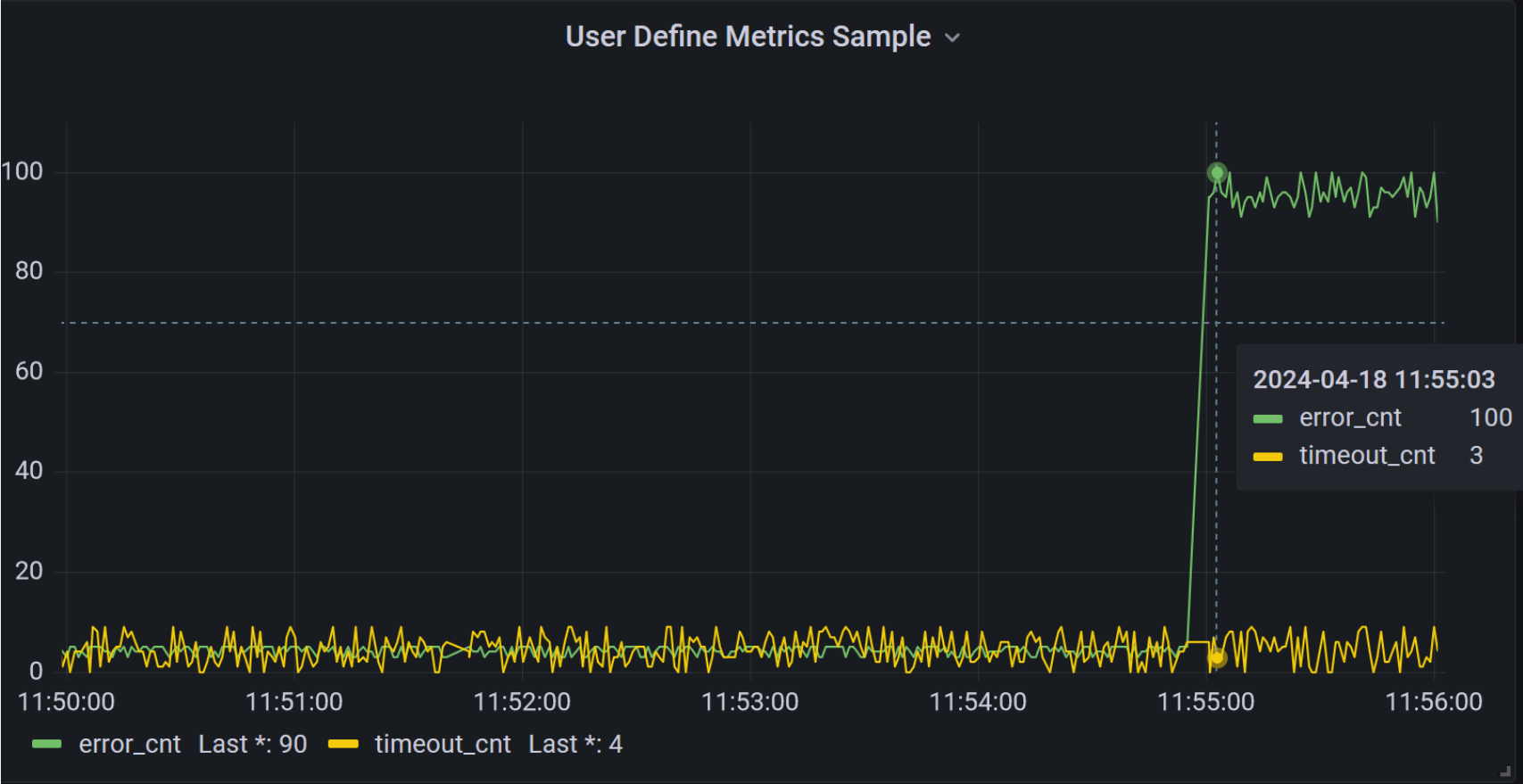
PJ46904 (Aug 2023) User-defined Metrics

- Additional enhancements included with this APAR
  - Kafka fallback for high availability configurations.
  - Securing the high-speed connector connections from z/TPF to the tpfrtmc offline utility by using TLS.

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Future

- **CDC Dashboards**

- Roadmap

Disclaimer

Any reference to future plans are for planning purposes only. IBM reserves the right to change those plans at its discretion. Any reliance on such a disclosure is solely at your own risk. IBM makes no commitment to provide additional information in the future.

CDC Dashboards

As-Is:

- Runtime metrics collection provides all CDC data types (except CDC_TPFDF) as JSON arriving in Kafka.
- Runtime metrics collection dashboards provided for REST, business events, and some bell-weather system metrics (CPU, ECBs, IOBs). No table definitions, python processing, pruning or dashboards provided for most data types.
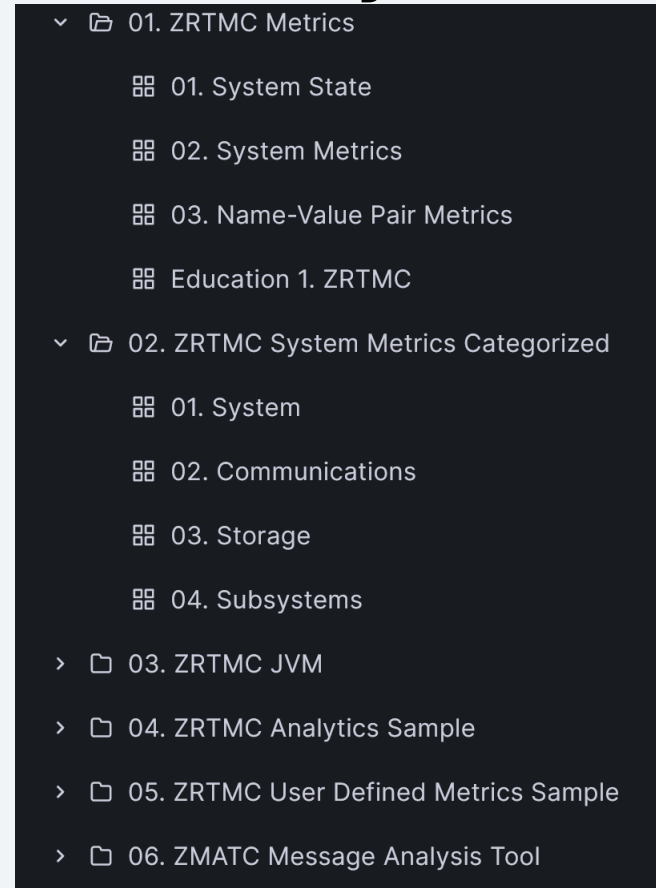- You use IBM Tivoli Monitoring Agent for z/TPF to see existing dashboards for all CDC data types.

CDC Dashboards

To-Be:

- Runtime metrics collection provides table definitions, python processing, sample pruning and dashboards for all CDC data types except DASD metrics data type – MOD level metrics.
- The DASD metrics data type – MOD level metrics – provides table definitions, python processing, and pruning. No dashboard is provided currently.
- End of support for IBM Tivoli Monitoring Agent for z/TPF is 28 June 2024. Runtime metrics collection CDC dashboard support will release by 28 June 2024. Beta is available.

CDC Dashboards – Default Folder Layout

- Default folder layout is modified to better prioritize the dashboards by likely usage.
- 02. System Metrics dashboard shows all CDC data types.
- CDC data types are also available in categorized dashboards:
  - 01. System
 - 02. Communications
  - 03. Storage
  - 04. Subsystems


```
∨  🗁  01. ZRTMC Metrics
        ⊞  01. System State
        ⊞  02. System Metrics
        ⊞  03. Name-Value Pair Metrics
        ⊞  Education 1. ZRTMC
∨  🗁  02. ZRTMC System Metrics Categorized
        ⊞  01. System
        ⊞  02. Communications
        ⊞  03. Storage
        ⊞  04. Subsystems
>  🗀  03. ZRTMC JVM
>  🗀  04. ZRTMC Analytics Sample
>  🗀  05. ZRTMC User Defined Metrics Sample
>  🗀  06. ZMATC Message Analysis Tool
```

CDC Dashboards – CDC Data Types

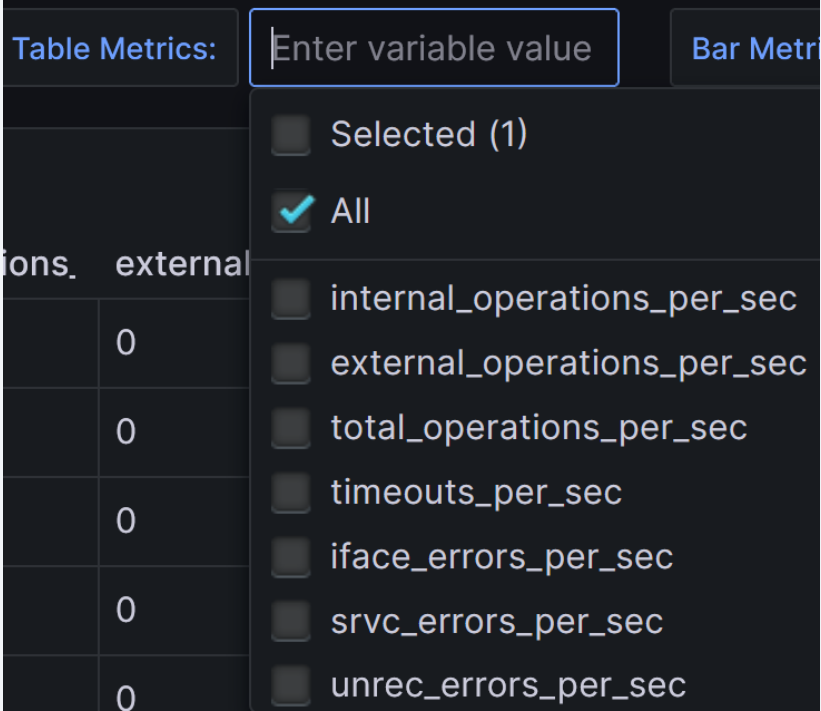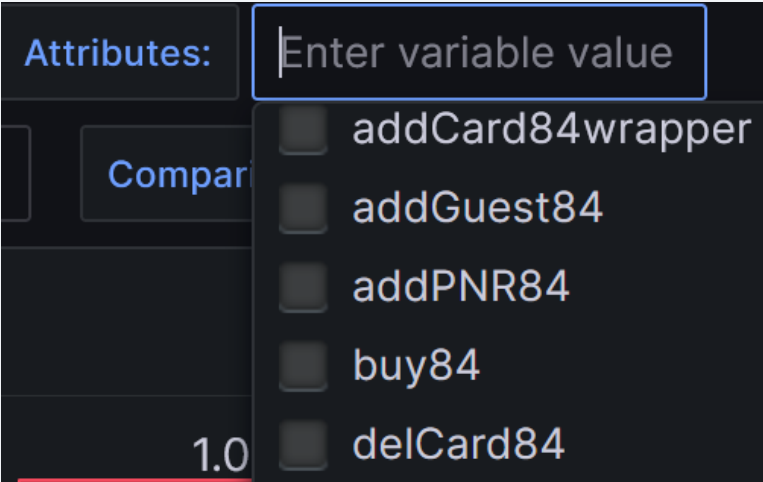- Select the CDC data type of interest.
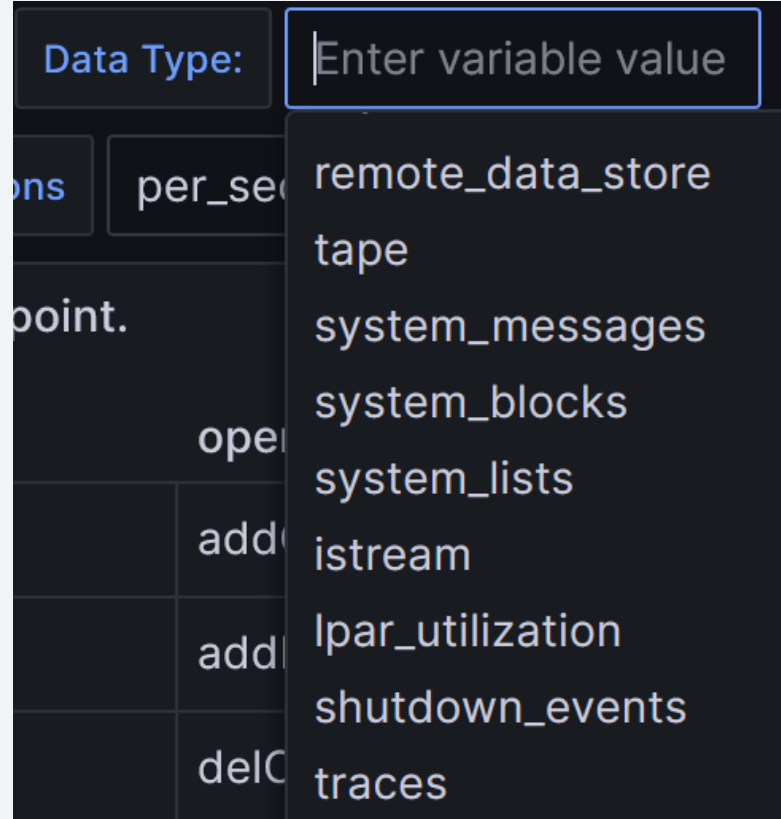
CDC Dashboards – Core Features

- View metrics across multiple systems on 1 dashboard.
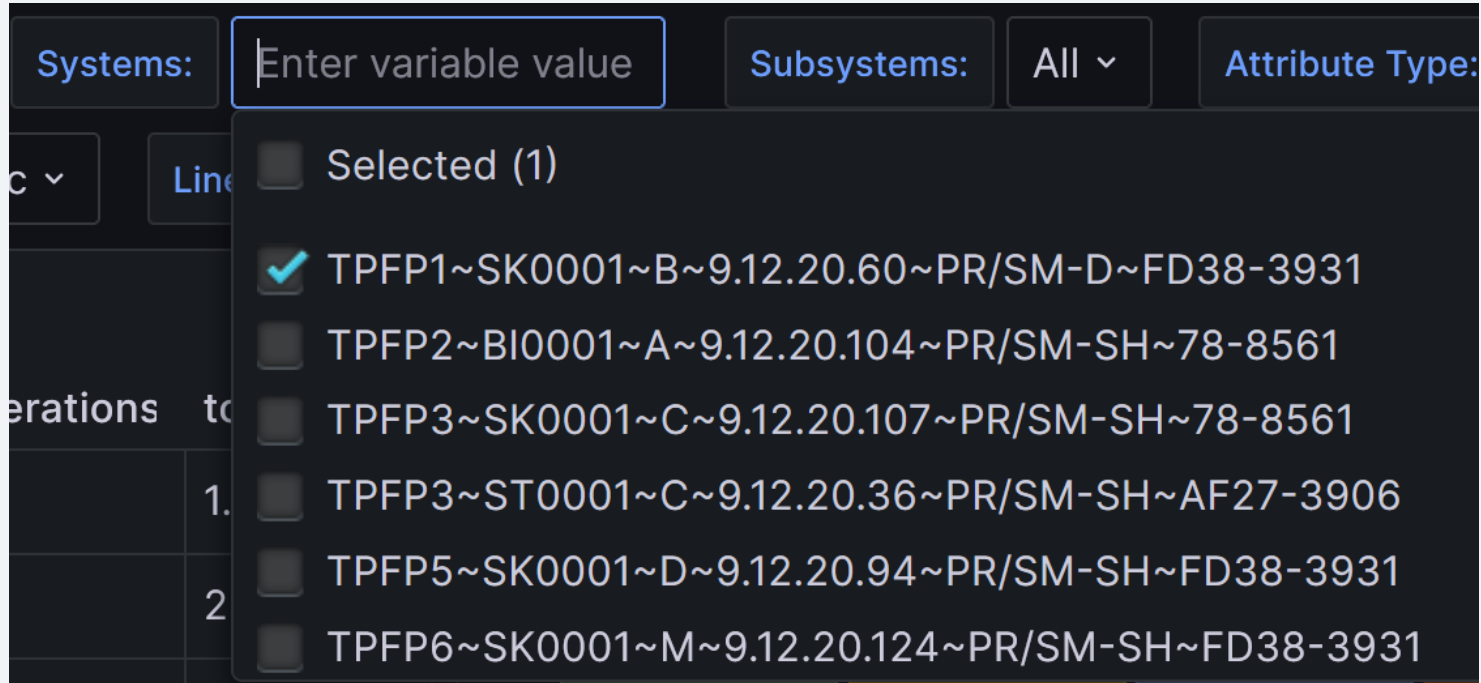
CDC Dashboards – Core Features

- Filter by subsystem or attributes such as file id, operation id, and so on.
- Choose which metrics to display in the table, bar or line graph.

CDC Dashboards – Core Features

- Table and bar graph shows most recent values with filters applied.
- Averages and totals across selected systems.

Selected metrics for rightmost time point.

systems	subsystems	operation	internal_operation
B	BSS	delGuest84	1.01
B	BSS	replacePNR84	1.01
avg_by-operation-B	N/A	N/A	1.39
total-B	N/A	N/A	11.1
total-*	N/A	N/A	11.1
avg-*	N/A	N/A	11.1

internal_operations_per_sec for rightmost time point.
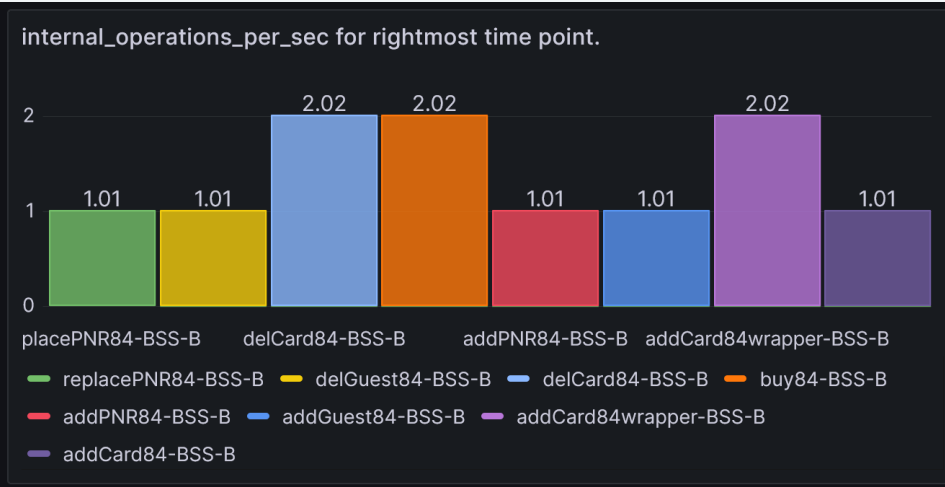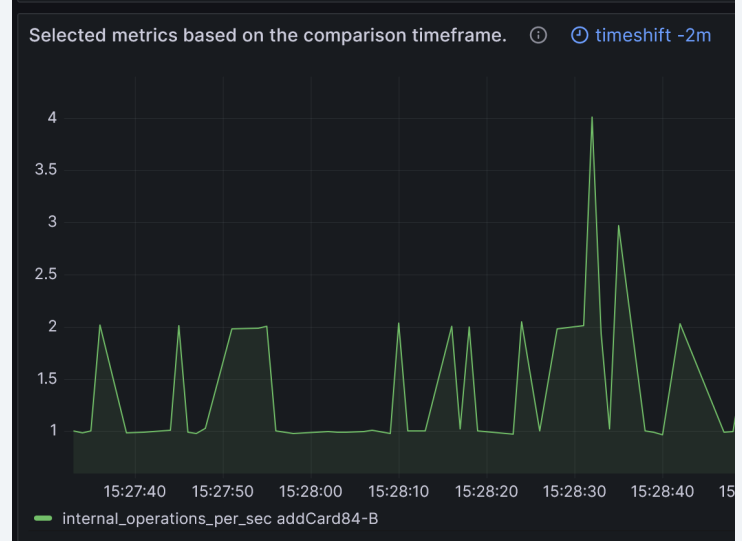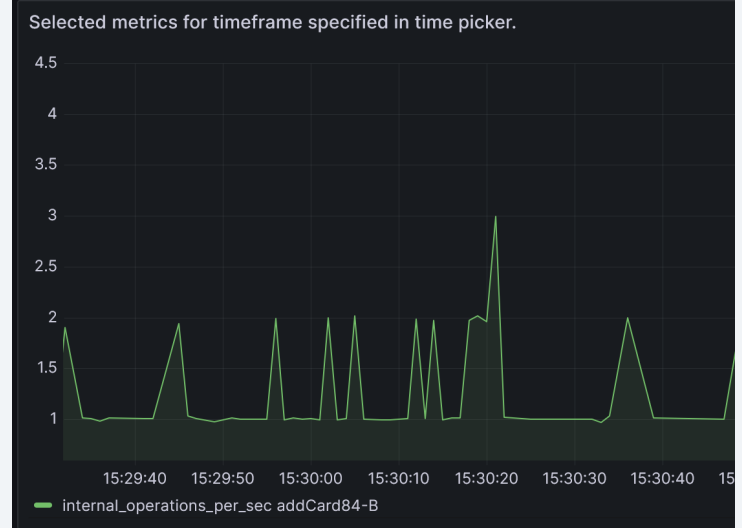
CDC Dashboards – Core Features

- Line graphs show metrics over time with filters applied.
- Sample pruning with max, min, and average summarized metrics.
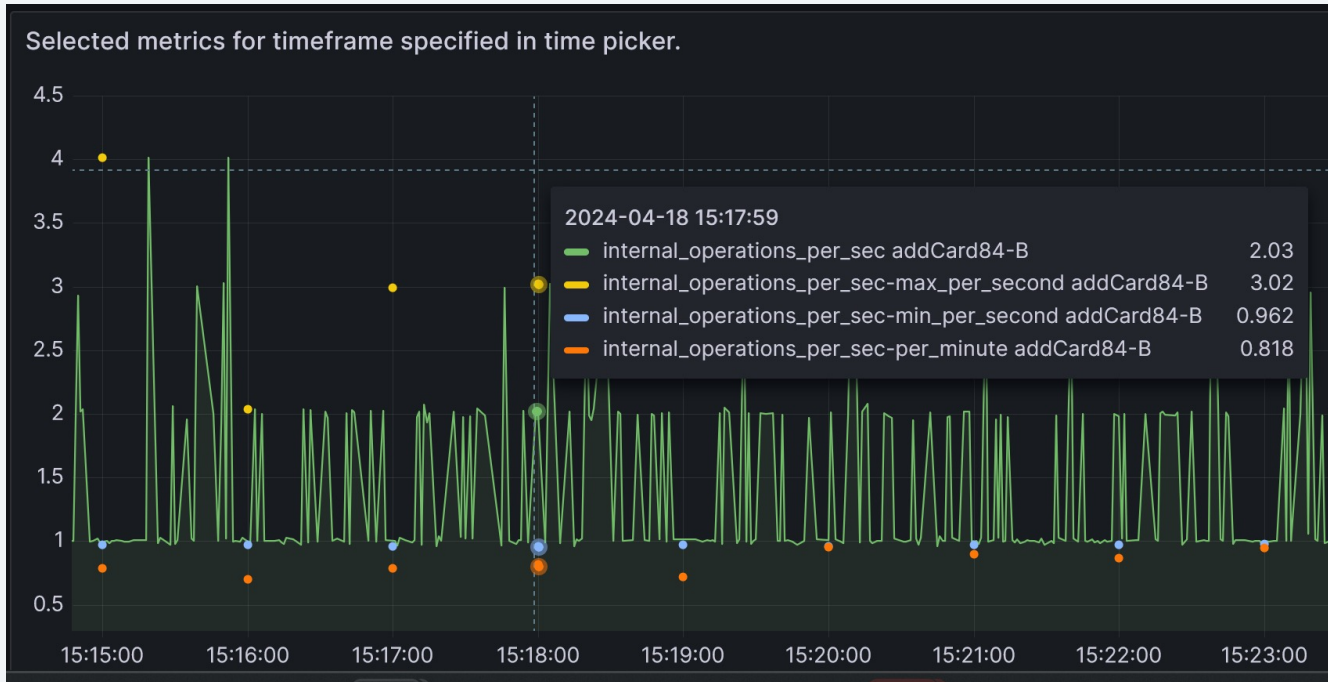
CDC Dashboards – Core Features

- Side by side comparison of metrics to an offset time (that is, compare current metrics to 7 days, 1 hour, or 2 minutes ago).

Selected metrics for timeframe specified in time picker.

Selected metrics based on the comparison timeframe. ⓘ 🕐 timeshift -2m

CDC Dashboards – Core Features

- Dashboard includes help that explains the metrics shown.

Documentation: dasd_service_time

Metric	Description	Source
ssid	The DASD subsystem id	MF1SSID
average_service_time	Average DASD service time Accumulated response time in microseconds / Number of times IOTIM incremented	MF2IOTIM MF2IOCNT
lowest_online_sda_on_lss	The lowest online symbolic device address on the logical subsystem	MF1DAD

Collection Routine: cdcdst.asm
Source: dctmfs.mac
Notes:
- Only DASD subsystem ids with an average service time greater than zero appear in the table.

CDC Dashboards – z/TPFDF Features

As-Is:

- IBM Tivoli Monitoring Agent for z/TPF shows the top 1-100 (default 10) file IDs for as many as 7 different z/TPFDF macro and metric usage. For example, the top 10 file IDs that issue DBRED.
- This method of collection is focused on which file IDs are <u>currently</u> the biggest users.
- This method of collection tends to report roughly the same file IDs for the 7 different z/TPFDF macro and metric usage types. The heavily used file IDs are likely to be the same set of file IDs throughout the day. This potentially hides the lesser used file IDs that are increasing in usage until they become a problem.

# CDC Dashboards – z/TPFDF Features

To-Be:

- z/TPFDF metrics are sent for all file IDs that have a DBOPN performed.
- You can analyze and detect slow growth scenarios before they become a problem on the list of top 10 users.

CDC Dashboards - Extensible Metrics Profiles

- You can use the metric profile to quickly select a subset of metrics.
- Your administrator can add metrics profiles and edit the metrics shown.
- Can be customized for any CDC data type.
- Defaults are provided for z/TPFDF metrics:
  - Main – DBOPN, DBRED, DBADD, DBDEL, DBREP, DBKEY
  - I/O – PFIND, PFILE, CFIND, CFILE, RELFC, GETFC, LRFND, LRFIL
  - LLR – LRFND, LRFIL

CDC Dashboards – Analysis Types

- Analysis types provided for CDC data types:
  - Top N by metric
  - Metric greater than X
- Analysis types provided for z/TPFDF data types:
  - All files opened
  - Modify APIs called
  - Read only APIs called
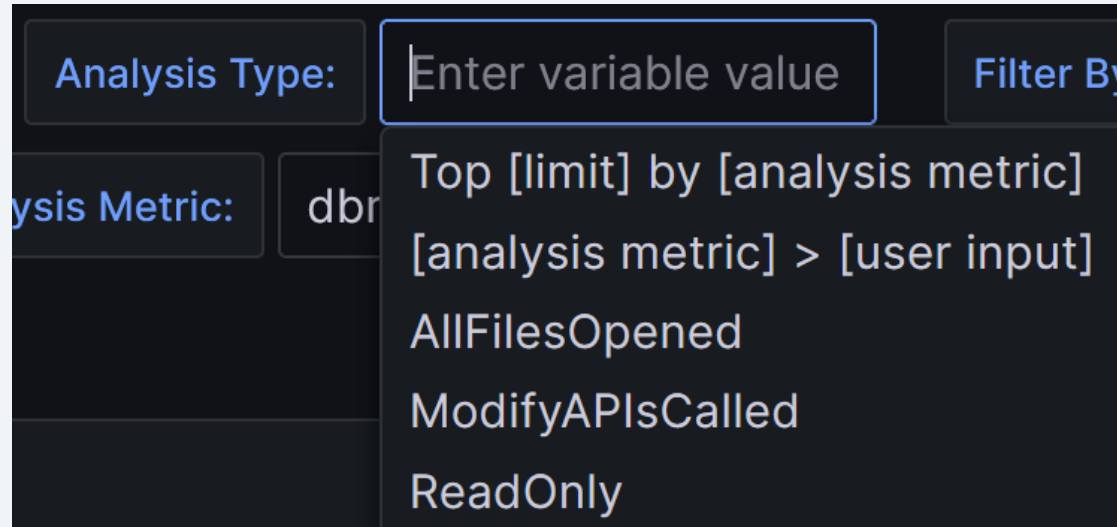
CDC Dashboards - Extensible Analysis Types

- Your administrator can add custom analysis such as:
  - Artificial intelligence such as machine learning of the CDC data for deviations from normal.
  - Correlations to your real-time user-defined metrics or name-value pair data.
- Can be customized for any CDC data type.

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- **Roadmap**

Runtime Metrics Collection: Customer Adoption Focus

We continue to work one on one with clients to facilitate their adoption and promotion of runtime metrics collection to production environments.

2017-2018
- PJ44680 - Automatically set owner names by configuration without application changes
- PJ44321 & PJ45264 - Name-value pair collection
- PJ45427 - Automatically set name-value pairs during DFDL processing using setVariable DFDL Annotation

2019-2020
- PJ45615 - Automatically set REST operation ID name-value pair
- PJ45657 - Real-time runtime metrics collection
- PJ46185 - New CDC data types DASD metrics, remote data store, and more

2021
- PJ46275 - JVM monitoring
- PJ46308 - Message analysis tool collection and dashboards

2022
- PJ46608 - JVM monitor up to 10 LPARs
- PJ46737 - Dashboards that show metrics, averages, and totals across multiple LPARs in a complex
- MySQL database support.
- PJ46739 - CDC monitor up to 10 LPARs
- PJ46946 - Reduce database permissions required
- PJ46853 - Fractional NVP scale factor

2023
- PJ47008 - Encrypt connections to and from Apache Kafka
- PJ46982 - Docker configuration for Linux on IBM Z
- IBM built open source containers for Linux on IBM Z for more secure dependencies
- Sample pruning methodology
- Java 11 support
- PJ46904 - User-defined metrics
- Encrypt connection from z/TPF to Linux utilities
- Improve Apache Kafka fallback scenarios

2024
- Security update
- NVP HA update
- CDC dashboards
- Red Hat Podman
- CRAS state
- OpenTelemetry APM support
- NVP up to 10 LPARs
- Message analysis tool application code path analytics

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Target personas
- Coverage and Operations
- Developer

Interested? Contact
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Thank you