**Debezium**

**HK Prod**

**Consulting Engagement Report**

Prepared for

Manulife

# Table of Contents

[Table of Contents](#_nlny4fylguy1)

[Version](#_9ptp626pfhb2)

[Document Information](#_4v9a68hln05e)

[Originator](#_1fob9te)

[Owner](#_evpgatow4dgj)

[Copyright](#_qoyrjaaoz9ey)

[Distribution](#_3znysh7)

[Confidentiality](#_1ln1nijf7yzi)

[Purpose](#_ctbsyshg8gxl)

[Executive Summary](#_haqruwyse4np)

[Red Hat Consulting Contact Information](#_9ka5wto7raif)

[How to use this Documentation](#_irmu7tmkgqlw)

[1. Prepare Prerequisites](#_m5ci4hinh357)

[1.1 applicationinsights-agent-3.4.17.jar](#_544hurys7stj)

[1.2 ojdbc11.jar](#_yr5niq3apuix)

[1.3 debezium-2.1.4-oracle.jar](#_21evvastpqc)

[1.4 java-11-openjdk-11.0.20.0.8-1.portable.jdk.el.x86\_64.tar.xz](#_5v1kb5a0rj75)

[1.5 amq-streams-2.3.0-bin.zip](#_v2cx57m4vd1z)

[2. OpenJDK Deployment](#_g19xc7f5wt93)

[3. Kafka Connect Deployment](#_c3os8kew9z64)

[4. Application Insight Configuration](#_2mtp0w2b96ts)

[5. Setup Debezium Startup Script](#_ozen27lw3yfs)

[6. Oracle Debezium Connector Deployment](#_kfy4hza00jix)

[7. User Acceptance Test](#_lvoagk7ejzim)

[7.1 Debezium Oracle Connector Test](#_kmjfme2te2ng)

[7.2 Debezium Logging Test](#_p5tolxqg47my)

[7.3 Debezium JMX Metrics Test](#_skmwbpnlghz3)

[7.3 Snapshot Testing](#_wyhxb55wbwi2)

[8. Setup Debezium as a Systemd Service (Optional)](#_2ic707wwuid)

[9. Operation](#_pvyq8krmxror)

[9.1 Creating a connector](#_41j8egy7205b)

[9.2 Deleting a connector](#_4bnr36txwtia)

[9.3 Check the connector](#_yk80snq0le79)

[9.4 Restart the connector](#_e1rrx0t6fif6)

[10. Issues](#_983n8ytnueia)

[10.1 Change events from Oracle database Delay](#_5xsiq8n5gpmy)

[10.2 Application Insight cannot use private endpoint](#_a2c7ta3hbpsd)

[10.3 Application Insight Error - Field 'time' on type 'Envelope' is older than the allowed min date](#_m5t6ffkjxzgq)

[11. Engaging Red Hat Global Support Services](#_quqokxirpxy1)

# 

# Version

| **Version** | **Date** | **Author** | **Remarks** |
| --- | --- | --- | --- |
| 1.0 | 9/2/2024 | Davy Cheung | First release |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# 

# Document Information

## **Originator**

Red Hat Consulting

## **Owner**

Red Hat Consulting - Confidential / Restricted Distribution

## **Copyright**

This document contains proprietary information that is for the exclusive use of Red Hat, Inc. and is not to be shared with personnel other than Red Hat, Inc. This document, and any portion thereof, may not be copied, reproduced, photocopied, stored electronically on a retrieval system, or transmitted without the express written consent of the owner.

Red Hat Consulting does not warrant this document to be free of errors or omissions. Red Hat Consulting reserves the right to make corrections, updates, revisions, or changes to the information contained herein. Red Hat Consulting does not warrant the material described herein to be free of patent infringement.

Unless provided otherwise in writing BY RED HAT Consulting, the information, and programs described herein are provided “as is” without warranty of any kind, including but not limited to the implied warranty of merchantability and fitness for a particular purpose. In no event will RED HAT Consulting, its officers, directors, or employees or affiliates of RED HAT Consulting, their respective officers, directors, or employees be liable to any entity for any special, collateral, incidental, or consequential damages, including without limitation, for any lost profits or lost savings, related or arising in any way from or out of the use or inability to use the information or programs set forth herein, even if it has been notified of the possibility of such damage by the purchaser or any third party.

## **Distribution**

Do not forward or copy without written permission from Red Hat Consulting.

Copies of this document are restricted to the following names:

Red Hat, Inc.  
Manulife

## **Confidentiality**

All information supplied to Manulife for the purpose of this engagement is to be considered Red Hat confidential

# Purpose

This report documents the overview, contact information, and technical details of the activities performed during the project engagement. Its purpose is to serve as a reference after the engagement is complete.

# Executive Summary

Red Hat Consulting was contracted to deliver a Debezium deployment on Manulife’s non-production environment.

# Red Hat Consulting Contact Information

The table below contains the contact information for the Red Hat Consulting personnel who supported the delivery of this consulting engagement.

| **Role** | **Name** | **Email** |
| --- | --- | --- |
| Consultant | Davy Cheung | dacheung@redhat.com |
|  |  |  |
|  |  |  |

# 

# How to use this Documentation

This document includes details of the Debezium setup including commands and script files that may have been used throughout the engagement, as well as additional information for using and administering Debezium.

The scripts are applicable at the time of the engagement journal and might not be relevant for other versions of Debezium. Please take extra care while reading this documentation.

This documentation is for users with a low to medium understanding of Debezium.

Things to take note of

| **Code blocks are commands used.** |
| --- |

Red fonts are a precaution and need to be taken extra care of prior to running the commands

Highlighted areas are variables/parameters that need to be changed or updated prior to running commands.

### THESE ARE COMMENTS ###

# 

# 1. Prepare Prerequisites

Before starting the deployment, you must prepare the following files.

* applicationinsights-agent-3.4.17.jar
* ojdbc11.jar
* debezium-2.3.4-oracle.jar
* java-11-openjdk-11.0.21.0.9-1.portable.jdk.el.x86\_64.tar.xz
* amq-streams-2.5.1-bin.zip

The above files can be downloaded by following the following procedures.

## 1.1 applicationinsights-agent-3.4.17.jar

This file can be downloaded from the GitHub release from Microsoft.

[https://github.com/microsoft/ApplicationInsights-Java/releases/download/3.4.17/applicationinsights-agent-3.4.17.jar](https://github.com/microsoft/ApplicationInsights-Java/releases/download/3.4.15/applicationinsights-agent-3.4.15.jar)

## 1.2 ojdbc11.jar

This file can be downloaded from Oracle, make sure you download the 21c driver instead of the 23c driver as I tested the 23c driver is not compatible with the current setup.

<https://download.oracle.com/otn-pub/otn_software/jdbc/2111/ojdbc11.jar>

## 1.3 debezium-2.3.4-oracle.jar

This file can be downloaded from Red Hat but you might need a Red Hat account with a valid subscription.

<https://access.redhat.com/jbossnetwork/restricted/listSoftware.html?downloadType=distributions&product=rhbod&version=2.3.4>

## 1.4 java-11-openjdk-11.0.21.0.9-1.portable.jdk.el.x86\_64.tar.xz

This file can be downloaded from Red Hat but you might need a Red Hat account with a valid subscription.

<https://access.redhat.com/jbossnetwork/restricted/listSoftware.html?downloadType=distributions&product=core.service.openjdk&version=11.0.21>

## 1.5 amq-streams-2.5.1-bin.zip

This file can be downloaded from Red Hat but you might need a Red Hat account with a valid subscription.

<https://access.redhat.com/jbossnetwork/restricted/listSoftware.html?downloadType=distributions&product=jboss.amq.streams&version=2.5.1>

# 2. OpenJDK Deployment

Unzip the OpenJDK to your desired location.

| mkdir $HOME/debezium  tar -xvf java-11-openjdk-11.0.21.0.9-1.portable.jdk.el.x86\_64.tar.xz -C $HOME/debezium |
| --- |

Create a symbolic link for version management.

| ln -s $HOME/debezium/java-11-openjdk-11.0.21.0.9-1.portable.jdk.el.x86\_64/ $HOME/debezium/openjdk |
| --- |

Set up the environment variable for the OpenJDK.

| cat <<'EOF' >> $HOME/.bashrc export JAVA\_HOME=$HOME/debezium/openjdk export PATH=$PATH:$JAVA\_HOME/bin EOF . $HOME/.bashrc |
| --- |

# 3. Kafka Connect Deployment

Unzip the AMQ Streams binaries to the desired location, which includes the Kafka Connect binaries.

| unzip amq-streams-2.3.0-bin.zip -d $HOME/debezium |
| --- |

Create a symbolic link for version management.

| ln -s $HOME/debezium/kafka\_2.13-3.3.1.redhat-00008/ $HOME/debezium/kafka |
| --- |

Set up the environment variable for the Kafka connect.

| cat <<'EOF' >> $HOME/.bashrc export KAFKA\_HOME=$HOME/debezium/kafka EOF . $HOME/.bashrc |
| --- |

Create the following configuration for the Kafka connect.

| cat <<'EOF' > $HOME/debezium/kafka/config/debezium-distributed.properties bootstrap.servers=mfcehubns-eas-ngedlhk-nprd-01.privatelink.servicebus.windows.net:9093 group.id=hk-oracle-01-debezium-cluster  offset.storage.topic=connect-offsets config.storage.topic=connect-configs status.storage.topic=connect-status  offset.storage.replication.factor=1 config.storage.replication.factor=1 status.storage.replication.factor=1  key.converter=org.apache.kafka.connect.json.JsonConverter value.converter=org.apache.kafka.connect.json.JsonConverter internal.key.converter=org.apache.kafka.connect.json.JsonConverter internal.value.converter=org.apache.kafka.connect.json.JsonConverter  internal.key.converter.schemas.enable=false internal.value.converter.schemas.enable=false  offset.flush.interval.ms=10000  ssl.endpoint.identification.algorithm= security.protocol=SASL\_SSL sasl.mechanism=PLAIN sasl.jaas.config=org.apache.kafka.common.security.plain.PlainLoginModule required username="$ConnectionString" password="Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>";  producer.ssl.endpoint.identification.algorithm= producer.security.protocol=SASL\_SSL producer.sasl.mechanism=PLAIN producer.sasl.jaas.config=org.apache.kafka.common.security.plain.PlainLoginModule required username="$ConnectionString" password="Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>";  consumer.ssl.endpoint.identification.algorithm= consumer.security.protocol=SASL\_SSL consumer.sasl.mechanism=PLAIN consumer.sasl.jaas.config=org.apache.kafka.common.security.plain.PlainLoginModule required username="$ConnectionString" password="Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>"; plugin.path=/home/hkdbz01/debezium/connector-plugins EOF |
| --- |

# 4. Application Insight Configuration

Deploy the applicationinsights-agent-3.4.17.jar to the place desired. For example.

| /home/hkdbz01/debezium/applicationinsights-agent-3.4.17.jar |
| --- |

Create the following applicationinsighs.json in the same directory as your application insight agent.

| cat <<'EOF' > /home/hkdbz01/debezium/applicationinsights.json {  "connectionString": "InstrumentationKey=<secret>;IngestionEndpoint=https://eastasia-0.in.applicationinsights.azure.com/;LiveEndpoint=https://eastasia.livediagnostics.monitor.azure.com/" } EOF |
| --- |

# 5. Setup Debezium Startup Script

Create the log folder for the Debezium logs in the location of your decision. For example:

| mkdir /home/hkdbz01/debezium/log |
| --- |

Create the following startup script.

| cat <<'EOF' > /home/hkdbz01/start\_debezium.sh export LOG\_DIR="/home/hkdbz01/debezium/log"  export KAFKA\_JMX\_OPTS="-javaagent:/home/hkdbz01/debezium/applicationinsights-agent-3.4.17.jar" $KAFKA\_HOME/bin/connect-distributed.sh -daemon $KAFKA\_HOME/config/debezium-distributed.properties EOF  chmod +x /home/hkdbz01/start\_debezium.sh |
| --- |

You can start up the Debezium as a background daemon by running the following command.

| ./start\_debezium.sh |
| --- |

You can find the debezium logs in /home/hkdbz01/debezium/log/ and the application insight logs from /home/hkdbz01/debezium/applicationinsights.log.

# 6. Oracle Debezium Connector Deployment

Create a directory for the Debezium connector plugin of your choice and unzip the Debezium Oracle connector in the directory.

| mkdir $HOME/debezium/connector-plugins unzip debezium-2.1.4-oracle.zip -d $HOME/debezium/connector-plugins |
| --- |

Copy the ojdbc11.jar to the unzipped Debezium Oracle connector directory.

| cp ojdbc11.jar $HOME/debezium/connector-plugins/debezium-connector-oracle/ |
| --- |

Create an oracle-con.json file for the content of the oracle connector configuration.

| cat <<'EOF' > oracle-con.json {  "name": "oracle-connector",  "config": {  "connector.class": "io.debezium.connector.oracle.OracleConnector",  "tasks.max": "1",  "database.hostname": "10.216.113.104",  "database.port": "1521",  "database.user": "dbzuser",  "database.password": "<password>",  "database.dbname" : "dhkt",  "topic.prefix": "dhkt",  "schema.include.list": "dwh",  "table.include.list": "dwh.campwb\_col\_lvl",  "snapshot.mode": "schema\_only",  "topic.creation.default.replication.factor":"1",  "topic.creation.default.partitions":"1",  "schema.history.internal": "io.debezium.storage.file.history.FileSchemaHistory",  "schema.history.internal.file.filename": "/home/hkdbz01/debezium/schema\_history.dat",  "schema.history.internal.store.only.captured.tables.ddl": "true",  "schema.history.internal.store.only.captured.databases.ddl": "true",  "transforms": "Reroute",  "transforms.Reroute.type": "io.debezium.transforms.ByLogicalTableRouter",  "transforms.Reroute.topic.regex": "(.\*)",  "transforms.Reroute.topic.replacement": "hk\_dwh\_cdc\_topic"  } } EOF |
| --- |

Start the Debezium server using the startup script and issue the following command to upload the configuration.

| curl -i -X POST -H "Accept:application/json" -H "Content-Type:application/json" http://localhost:8083/connectors/ -d @oracle-con.json |
| --- |

You can then remove the oracle-con.json after the configuration.

# 7. User Acceptance Test

## 7.1 Debezium Oracle Connector Test

The following is a setup for a test case to verify the Debezium is working and is able to generate events based on database changes.

Create the consumer-test.properties with the following content.

**consumer-test.properties**

| ssl.endpoint.identification.algorithm= security.protocol=SASL\_SSL sasl.mechanism=PLAIN sasl.jaas.config=org.apache.kafka.common.security.plain.PlainLoginModule required username="$ConnectionString" password="Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>"; producer.ssl.endpoint.identification.algorithm= producer.security.protocol=SASL\_SSL producer.sasl.mechanism=PLAIN producer.sasl.jaas.config=org.apache.kafka.common.security.plain.PlainLoginModule required username="$ConnectionString" password="Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>"; consumer.ssl.endpoint.identification.algorithm= consumer.security.protocol=SASL\_SSL consumer.sasl.mechanism=PLAIN consumer.sasl.jaas.config=org.apache.kafka.common.security.plain.PlainLoginModule required username="$ConnectionString" password="Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>"; |
| --- |

Execute the following command, it will open up a console to print out any new coming events for the topic of your choice. Then trigger the database change by performing any operation (e.g. insert, update, delete) and wait for the console to display the events.

| $KAFKA\_HOME/bin/kafka-console-consumer.sh --consumer.config $HOME/consumer-test.properties --group dwh --topic hk\_dwh\_cdc\_topic --bootstrap-server mfcehubns-eas-ngedlhk-nprd-01.privatelink.servicebus.windows.net:9093 |
| --- |

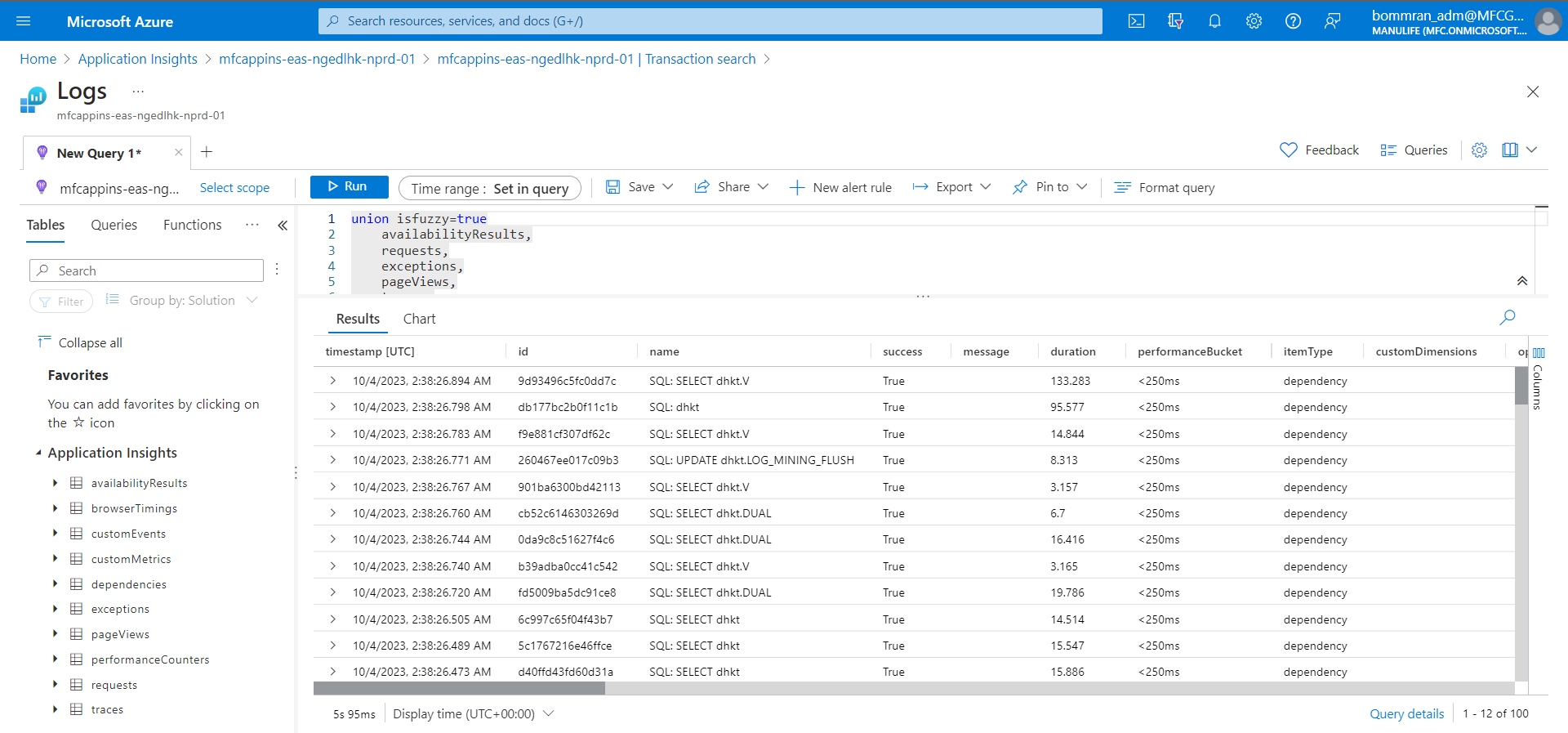
Testing result:

An event is received by triggering an update event on the Oracle database as follows.

| {"schema":{"type":"struct","fields":[{"type":"struct","fields":[{"type":"string","optional":false,"field":"CAMPAIGN\_ID"},{"type":"string","optional":false,"field":"COLUMN\_ID"},{"type":"string","optional":true,"field":"FIELD\_ID"},{"type":"string","optional":true,"field":"FIELD\_ID2"},{"type":"string","optional":true,"field":"FIELD\_ID3"},{"type":"string","optional":true,"field":"COLUMN\_LABEL"},{"type":"int32","optional":true,"field":"COLUMN\_WIDTH"},{"type":"string","optional":true,"field":"COLUMN\_ALIGNMENT"},{"type":"string","optional":true,"field":"INPUT\_COLUMN\_INDICATOR"},{"type":"string","optional":true,"field":"BOLD\_INDICATOR"},{"type":"string","optional":true,"field":"ITALIC\_INDICATOR"},{"type":"string","optional":true,"field":"UNDERLINE\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_CUST\_DETAIL\_INDICATOR"},{"type":"string","optional":true,"field":"DATA\_TYPE"},{"type":"string","optional":true,"field":"SORT\_INDICATOR"},{"type":"string","optional":true,"field":"SEARCHABLE\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_EMAIL\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_INVALID\_ADDR\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_OPT\_OUT\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_TEL\_INDICATOR"}],"optional":true,"name":"hk\_dwh\_cdc\_topic.Value","field":"before"},{"type":"struct","fields":[{"type":"string","optional":false,"field":"CAMPAIGN\_ID"},{"type":"string","optional":false,"field":"COLUMN\_ID"},{"type":"string","optional":true,"field":"FIELD\_ID"},{"type":"string","optional":true,"field":"FIELD\_ID2"},{"type":"string","optional":true,"field":"FIELD\_ID3"},{"type":"string","optional":true,"field":"COLUMN\_LABEL"},{"type":"int32","optional":true,"field":"COLUMN\_WIDTH"},{"type":"string","optional":true,"field":"COLUMN\_ALIGNMENT"},{"type":"string","optional":true,"field":"INPUT\_COLUMN\_INDICATOR"},{"type":"string","optional":true,"field":"BOLD\_INDICATOR"},{"type":"string","optional":true,"field":"ITALIC\_INDICATOR"},{"type":"string","optional":true,"field":"UNDERLINE\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_CUST\_DETAIL\_INDICATOR"},{"type":"string","optional":true,"field":"DATA\_TYPE"},{"type":"string","optional":true,"field":"SORT\_INDICATOR"},{"type":"string","optional":true,"field":"SEARCHABLE\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_EMAIL\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_INVALID\_ADDR\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_OPT\_OUT\_INDICATOR"},{"type":"string","optional":true,"field":"DISPLAY\_TEL\_INDICATOR"}],"optional":true,"name":"hk\_dwh\_cdc\_topic.Value","field":"after"},{"type":"struct","fields":[{"type":"string","optional":false,"field":"version"},{"type":"string","optional":false,"field":"connector"},{"type":"string","optional":false,"field":"name"},{"type":"int64","optional":false,"field":"ts\_ms"},{"type":"string","optional":true,"name":"io.debezium.data.Enum","version":1,"parameters":{"allowed":"true,last,false,incremental"},"default":"false","field":"snapshot"},{"type":"string","optional":false,"field":"db"},{"type":"string","optional":true,"field":"sequence"},{"type":"string","optional":false,"field":"schema"},{"type":"string","optional":false,"field":"table"},{"type":"string","optional":true,"field":"txId"},{"type":"string","optional":true,"field":"scn"},{"type":"string","optional":true,"field":"commit\_scn"},{"type":"string","optional":true,"field":"lcr\_position"},{"type":"string","optional":true,"field":"rs\_id"},{"type":"int32","optional":true,"field":"ssn"},{"type":"int32","optional":true,"field":"redo\_thread"},{"type":"string","optional":true,"field":"user\_name"}],"optional":false,"name":"io.debezium.connector.oracle.Source","field":"source"},{"type":"string","optional":false,"field":"op"},{"type":"int64","optional":true,"field":"ts\_ms"},{"type":"struct","fields":[{"type":"string","optional":false,"field":"id"},{"type":"int64","optional":false,"field":"total\_order"},{"type":"int64","optional":false,"field":"data\_collection\_order"}],"optional":true,"name":"event.block","version":1,"field":"transaction"}],"optional":false,"name":"hk\_dwh\_cdc\_topic.Envelope","version":1},"payload":{"before":{"CAMPAIGN\_ID":"","COLUMN\_ID":"","FIELD\_ID":"TestDBZ04","FIELD\_ID2":null,"FIELD\_ID3":null,"COLUMN\_LABEL":null,"COLUMN\_WIDTH":null,"COLUMN\_ALIGNMENT":null,"INPUT\_COLUMN\_INDICATOR":null,"BOLD\_INDICATOR":null,"ITALIC\_INDICATOR":null,"UNDERLINE\_INDICATOR":null,"DISPLAY\_CUST\_DETAIL\_INDICATOR":null,"DATA\_TYPE":null,"SORT\_INDICATOR":null,"SEARCHABLE\_INDICATOR":null,"DISPLAY\_EMAIL\_INDICATOR":null,"DISPLAY\_INVALID\_ADDR\_INDICATOR":null,"DISPLAY\_OPT\_OUT\_INDICATOR":null,"DISPLAY\_TEL\_INDICATOR":null},"after":{"CAMPAIGN\_ID":"","COLUMN\_ID":"","FIELD\_ID":"TestDBZ05","FIELD\_ID2":null,"FIELD\_ID3":null,"COLUMN\_LABEL":null,"COLUMN\_WIDTH":null,"COLUMN\_ALIGNMENT":null,"INPUT\_COLUMN\_INDICATOR":null,"BOLD\_INDICATOR":null,"ITALIC\_INDICATOR":null,"UNDERLINE\_INDICATOR":null,"DISPLAY\_CUST\_DETAIL\_INDICATOR":null,"DATA\_TYPE":null,"SORT\_INDICATOR":null,"SEARCHABLE\_INDICATOR":null,"DISPLAY\_EMAIL\_INDICATOR":null,"DISPLAY\_INVALID\_ADDR\_INDICATOR":null,"DISPLAY\_OPT\_OUT\_INDICATOR":null,"DISPLAY\_TEL\_INDICATOR":null},"source":{"version":"2.1.4.Final-redhat-00001","connector":"oracle","name":"dhkt","ts\_ms":1693982853000,"snapshot":"false","db":"DHKT","sequence":null,"schema":"DWH","table":"CAMPWB\_COL\_LVL","txId":"0018002b000038c9","scn":"14769662687985","commit\_scn":"14769662687986","lcr\_position":null,"rs\_id":null,"ssn":0,"redo\_thread":1,"user\_name":"DWH"},"op":"u","ts\_ms":1693982856043,"transaction":null}} |
| --- |

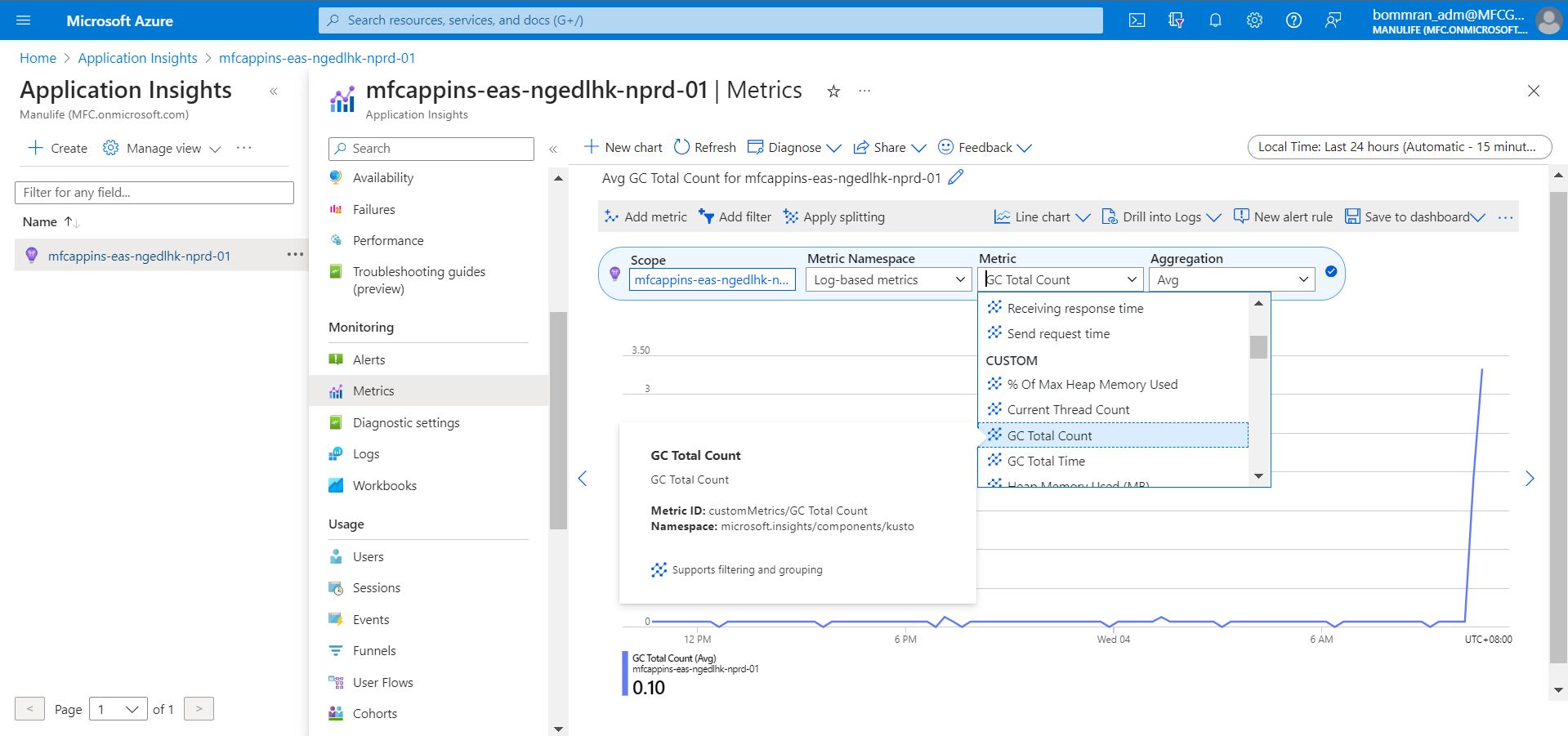
## 7.2 Debezium Logging Test

The Debezium logs are sent to the application insight workspace and can be viewed from ‘Application Insight -> Monitoring -> Logs’.

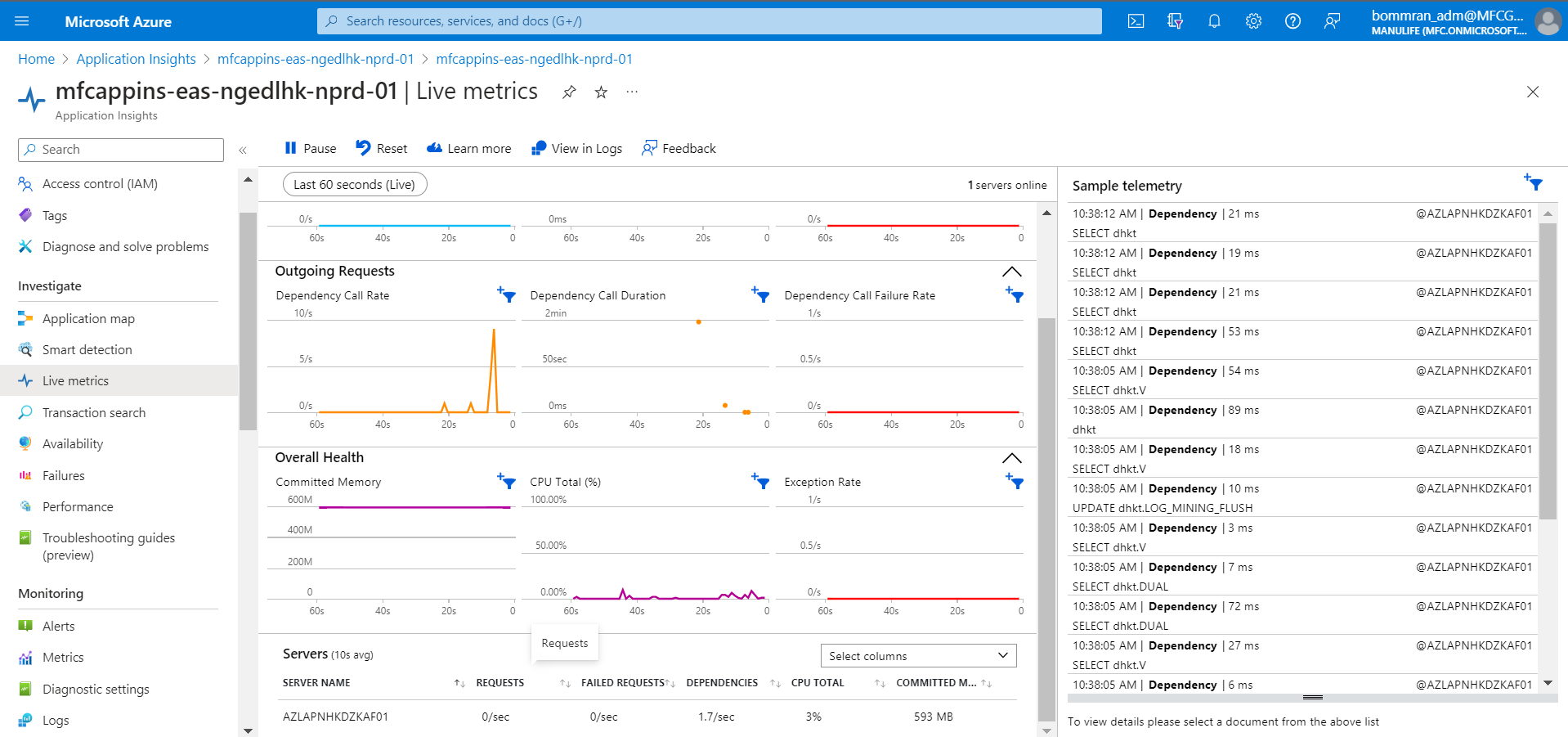


## 7.3 Debezium JMX Metrics Test

The Debezium JMX metrics are sent to the application insight workspace and can be viewed from ‘Application Insight -> Monitoring -> Metrics’.



Not only the JMX metrics are sent to Application Insight, but you can also view the host live metrics by accessing ‘Application Insight -> Investigate -> Live metrics’.



## 

## 7.4 Snapshot Testing

We conducted snapshot testing on 2023-09-28, which included the following 20 tables, this testing is completed. 5134431 records have been processed with 05:34:58 duration, the throughput is ~250 messages per second. The throughput is capped by the Azure Event Hub due to the throughput limit of standard tier subscriptions. For more information, please refer to the logs section.

| DHKT.DWH.AAS\_CHANGE\_HISTORY\_DHKP, DHKT.DWH.ACTION\_DIM, DHKT.DWH.ACTIVE\_AGENT, DHKT.DWH.ACTUARIAL\_BASIC\_ISSUE\_AGE, DHKT.DWH.ACTUARIAL\_CLAIM\_ALIAS, DHKT.DWH.ACTUARIAL\_CLAIM\_ALIAS\_DESC, DHKT.DWH.ACTUARIAL\_CLAIM\_MASTER, DHKT.DWH.ACTUARIAL\_CLAIM\_POLICY, DHKT.DWH.ACTUARIAL\_EXCHANGE\_RATE, DHKT.DWH.ACTUARIAL\_IBNR, DHKT.DWH.ACTUARIAL\_NOL\_FA\_TYPE\_2, DHKT.DWH.ACTUARIAL\_PLAN\_TYPE\_2, DHKT.DWH.ACTUARIAL\_PUA\_OYT, DHKT.DWH.ACTUARIAL\_QX\_TYPE\_2, DHKT.DWH.ACTUARIAL\_TEMP\_EXTRA, DHKT.DWH.ACT\_IBNR\_AMOUNT, DHKT.DWH.AC\_AGENT\_INFO, DHKT.DWH.AGENCY\_DIRECTOR\_MONTH, DHKT.DWH.AGENCY\_IP\_SBT\_TRACKING\_REPORT, DHKT.DWH.AGENT\_CONTRACT\_MONTH |
| --- |

Logs:

| [2023-09-28 01:59:52,428] INFO [oracle-snapshot-test-connector|task-0] Snapshot step 1 - Preparing (io.debezium.relational.RelationalSnapshotChangeEventSource:91) [2023-09-28 01:59:52,428] INFO [oracle-snapshot-test-connector|task-0] Snapshot step 2 - Determining captured tables (io.debezium.relational.RelationalSnapshotChangeEventSource:100) [2023-09-28 02:00:03,730] INFO [oracle-snapshot-test-connector|task-0] Snapshot step 3 - Locking captured tables [DHKT.DWH.AAS\_CHANGE\_HISTORY\_DHKP, DHKT.DWH.ACTION\_DIM, DHKT.DWH.ACTIVE\_AGENT, DHKT.DWH.ACTUARIAL\_BASIC\_ISSUE\_AGE, DHKT.DWH.ACTUARIAL\_CLAIM\_ALIAS, DHKT.DWH.ACTUARIAL\_CLAIM\_ALIAS\_DESC, DHKT.DWH.ACTUARIAL\_CLAIM\_MASTER, DHKT.DWH.ACTUARIAL\_CLAIM\_POLICY, DHKT.DWH.ACTUARIAL\_EXCHANGE\_RATE, DHKT.DWH.ACTUARIAL\_IBNR, DHKT.DWH.ACTUARIAL\_NOL\_FA\_TYPE\_2, DHKT.DWH.ACTUARIAL\_PLAN\_TYPE\_2, DHKT.DWH.ACTUARIAL\_PUA\_OYT, DHKT.DWH.ACTUARIAL\_QX\_TYPE\_2, DHKT.DWH.ACTUARIAL\_TEMP\_EXTRA, DHKT.DWH.ACT\_IBNR\_AMOUNT, DHKT.DWH.AC\_AGENT\_INFO, DHKT.DWH.AGENCY\_DIRECTOR\_MONTH, DHKT.DWH.AGENCY\_IP\_SBT\_TRACKING\_REPORT, DHKT.DWH.AGENT\_CONTRACT\_MONTH] (io.debezium.relational.RelationalSnapshotChangeEventSource:107) [2023-09-28 02:00:03,976] INFO [oracle-snapshot-test-connector|task-0] Snapshot step 4 - Determining snapshot offset (io.debezium.relational.RelationalSnapshotChangeEventSource:113) [2023-09-28 02:00:04,573] INFO [oracle-snapshot-test-connector|task-0] Snapshot step 5 - Reading structure of captured tables (io.debezium.relational.RelationalSnapshotChangeEventSource:116) [2023-09-28 02:05:56,519] INFO [oracle-snapshot-test-connector|task-0] Snapshot step 6 - Persisting schema history (io.debezium.relational.RelationalSnapshotChangeEventSource:120) [2023-09-28 02:06:17,794] INFO [oracle-snapshot-test-connector|task-0] Snapshot step 7 - Snapshotting data (io.debezium.relational.RelationalSnapshotChangeEventSource:132) [2023-09-28 01:59:52,426] INFO [oracle-snapshot-test-connector|task-0] WorkerSourceTask{id=oracle-snapshot-test-connector-0} Source task finished initialization and start (org.apache.kafka.connect.runtime.AbstractWorkerSourceTask:271) [2023-09-28 04:54:20,075] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 2293338 records for table 'DHKT.DWH.AAS\_CHANGE\_HISTORY\_DHKP'; total duration '02:48:02.279' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:54:20,166] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 7 records for table 'DHKT.DWH.ACTION\_DIM'; total duration '00:00:00.091' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,507] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 80851 records for table 'DHKT.DWH.ACTIVE\_AGENT'; total duration '00:04:12.341' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,561] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_BASIC\_ISSUE\_AGE'; total duration '00:00:00.053' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,580] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_CLAIM\_ALIAS'; total duration '00:00:00.019' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,595] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_CLAIM\_ALIAS\_DESC'; total duration '00:00:00.015' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,624] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_CLAIM\_MASTER'; total duration '00:00:00.029' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,638] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_CLAIM\_POLICY'; total duration '00:00:00.014' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,652] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_EXCHANGE\_RATE'; total duration '00:00:00.014' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,664] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_IBNR'; total duration '00:00:00.012' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,676] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_NOL\_FA\_TYPE\_2'; total duration '00:00:00.012' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,689] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_PLAN\_TYPE\_2'; total duration '00:00:00.013' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,700] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_PUA\_OYT'; total duration '00:00:00.011' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,716] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_QX\_TYPE\_2'; total duration '00:00:00.016' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,728] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACTUARIAL\_TEMP\_EXTRA'; total duration '00:00:00.012' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 04:58:32,740] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 0 records for table 'DHKT.DWH.ACT\_IBNR\_AMOUNT'; total duration '00:00:00.011' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 06:36:35,806] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 1397924 records for table 'DHKT.DWH.AC\_AGENT\_INFO'; total duration '01:38:03.066' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 06:37:14,610] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 7321 records for table 'DHKT.DWH.AGENCY\_DIRECTOR\_MONTH'; total duration '00:00:38.803' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 06:37:15,177] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 1414 records for table 'DHKT.DWH.AGENCY\_IP\_SBT\_TRACKING\_REPORT'; total duration '00:00:00.567' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) [2023-09-28 07:41:15,609] INFO [oracle-snapshot-test-connector|task-0] Finished exporting 1353576 records for table 'DHKT.DWH.AGENT\_CONTRACT\_MONTH'; total duration '01:04:00.431' (io.debezium.relational.RelationalSnapshotChangeEventSource:417) |
| --- |

# 8. Setup Debezium as a Systemd Service (Optional)

Here is an example of a systemd unit configuration that can be deployed to run Debezium as a service. However, please note that this action requires system-level privileges, which were not implemented during the project due to limited user access rights.

| [Unit] Description=Debezium Oracle Connector After=network.target nss-lookup.target  [Service] Type=forking User=hkdbz01 Group=hkdbz01 Environment="LOG\_DIR=/home/hkdbz01/debezium/log" Environment="KAFKA\_JMX\_OPTS=-javaagent:/home/hkdbz01/debezium/applicationinsights-agent-3.4.17.jar"  Environment="JAVA\_HOME=/home/hkdbz01/debezium/openjdk"  Environment="PATH=$PATH:$JAVA\_HOME/bin" ExecStart=/home/hkdbz01/debezium/kafka/connect-distributed -daemon /home/hkdbz01/debezium/kafka/connect-distributed.properties  [Install] WantedBy=multi-user.target |
| --- |

# 9. Operation

## 9.1 Creating a connector

You can prepare a connector configuration JSON file and use the following command to create a Debezium connector.

Example:

| curl -i -X POST -H "Accept:application/json" -H "Content-Type:application/json" http://localhost:8083/connectors/ -d @oracle-con.json |
| --- |

Example output:

| HTTP/1.1 100 Continue  HTTP/1.1 201 Created Date: Wed, 06 Sep 2023 03:58:44 GMT Location: http://localhost:8083/connectors/oracle-connector Content-Type: application/json Content-Length: 2117 Server: Jetty(9.4.48.v20220622-redhat-00001)   {"name":"oracle-connector","config":{"connector.class":"io.debezium.connector.oracle.OracleConnector","tasks.max":"1","database.hostname":"10.216.113.104","database.port":"1521","database.user":"dbzuser","database.password":"<secret>","database.dbname":"dhkt","topic.prefix":"dhkt","schema.include.list":"dwh","table.include.list":"dwh.campwb\_col\_lvl","snapshot.mode":"schema\_only","topic.creation.default.replication.factor":"1","topic.creation.default.partitions":"1","schema.history.internal.store.only.captured.tables.ddl":"true","schema.history.internal.store.only.captured.databases.ddl":"true","schema.history.internal.producer.ssl.endpoint.identification.algorithm":"","schema.history.internal.producer.security.protocol":"SASL\_SSL","schema.history.internal.producer.sasl.mechanism":"PLAIN","schema.history.internal.producer.sasl.jaas.config":"org.apache.kafka.common.security.plain.PlainLoginModule required username=\"$ConnectionString\" password=\"Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>\";","schema.history.internal.consumer.ssl.endpoint.identification.algorithm":"","schema.history.internal.consumer.security.protocol":"SASL\_SSL","schema.history.internal.consumer.sasl.mechanism":"PLAIN","schema.history.internal.consumer.sasl.jaas.config":"org.apache.kafka.common.security.plain.PlainLoginModule required username=\"$ConnectionString\" password=\"Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>\";","schema.history.internal.kafka.bootstrap.servers":"mfcehubns-eas-ngedlhk-nprd-01.privatelink.servicebus.windows.net:9093","schema.history.internal.kafka.topic":"schema-changes.inventory","transforms":"Reroute","transforms.Reroute.type":"io.debezium.transforms.ByLogicalTableRouter","transforms.Reroute.topic.regex":"(.\*)","transforms.Reroute.topic.replacement":"hk\_dwh\_cdc\_topic","name":"oracle-connector"},"tasks":[],"type":"source"} |
| --- |

## 9.2 Deleting a connector

You can use the following command to delete a Debezium connector by specifying the connector name with the context path /connectors/**<connector name>**.

Example:

| curl -i -X DELETE http://localhost:8083/connectors/oracle-connector |
| --- |

Example output:

| HTTP/1.1 204 No Content Date: Wed, 06 Sep 2023 03:17:21 GMT Server: Jetty(9.4.48.v20220622-redhat-00001) |
| --- |

## 9.3 Check the connector

The following command can be used to check which connector is installed.

| curl -X GET -H "Accept:application/json" localhost:8083/connectors |
| --- |

Example output:

| ["oracle-connector"] |
| --- |

The following command can be used to the connector configuration by specifying the connector name with the context path /connectors/**<connector name>**.

| curl -X GET -H "Accept:application/json" localhost:8083/connectors/oracle-connector |
| --- |

Example output:

| {"name":"oracle-connector","config":{"connector.class":"io.debezium.connector.oracle.OracleConnector","topic.creation.default.partitions":"1","tasks.max":"1","schema.history.internal.consumer.sasl.jaas.config":"org.apache.kafka.common.security.plain.PlainLoginModule required username=\"$ConnectionString\" password=\"Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>\";","transforms":"Reroute","schema.include.list":"dwh","schema.history.internal.store.only.captured.tables.ddl":"true","schema.history.internal.store.only.captured.databases.ddl":"true","topic.prefix":"dhkt","transforms.Reroute.topic.replacement":"hk\_dwh\_cdc\_topic","schema.history.internal.kafka.topic":"schema-changes.inventory","schema.history.internal.producer.security.protocol":"SASL\_SSL","topic.creation.default.replication.factor":"1","schema.history.internal.producer.sasl.mechanism":"PLAIN","database.user":"dbzuser","database.dbname":"dhkt","transforms.Reroute.type":"io.debezium.transforms.ByLogicalTableRouter","schema.history.internal.consumer.ssl.endpoint.identification.algorithm":"","schema.history.internal.kafka.bootstrap.servers":"mfcehubns-eas-ngedlhk-nprd-01.privatelink.servicebus.windows.net:9093","transforms.Reroute.topic.regex":"(.\*)","database.port":"1521","schema.history.internal.producer.ssl.endpoint.identification.algorithm":"","database.hostname":"10.216.113.104","database.password":"Manulife2023\_dbz","name":"oracle-connector","schema.history.internal.producer.sasl.jaas.config":"org.apache.kafka.common.security.plain.PlainLoginModule required username=\"$ConnectionString\" password=\"Endpoint=sb://mfcehubns-eas-ngedlhk-nprd-01.servicebus.windows.net/;SharedAccessKeyName=RootManageSharedAccessKey;SharedAccessKey=<secret>\";","schema.history.internal.consumer.sasl.mechanism":"PLAIN","table.include.list":"dwh.campwb\_col\_lvl","snapshot.mode":"schema\_only\_recovery","schema.history.internal.consumer.security.protocol":"SASL\_SSL"},"tasks":[{"connector":"oracle-connector","task":0}],"type":"source"} |
| --- |

The following command can be used to check the status of a Debezium connector by specifying the connector name with the context path /connectors/**<connector name>**/status.

| curl -X GET -H "Accept:application/json" localhost:8083/connectors/oracle-connector/status |
| --- |

Example output:

| {"name":"oracle-connector","connector":{"state":"RUNNING","worker\_id":"10.84.139.5:8083"},"tasks":[{"id":0,"state":"RUNNING","worker\_id":"10.84.139.5:8083"}],"type":"source"} |
| --- |

## 9.4 Restart the connector

The following command can be used to restart a Debezium connector by specifying the connector name with the context path /connectors/**<connector name>**/restart.

| curl -X POST -H "Accept:application/json" localhost:8083/connectors/oracle-connector/restart |
| --- |

If the output does respond with any error, then the restart should be successfully executed.

# 

# 10. Issues

## 10.1 Change events from Oracle database Delay

During the initial setup, we encountered a huge delay between updating the database and receiving the event. After some investigation, we suspect that it is because of having a small redo log size and we also received the following warning.

| [2023-08-28 03:07:52,898] WARN [oracle-connector|task-0] Redo logs may be sized too small using the default mining strategy, consider increasing redo log sizes to a minimum of 500MB. (io.debezium.connector.oracle.logminer.LogMinerStreamingChangeEventSource:248) |
| --- |

After reconfiguring the redo log size from 50MB to 500MB, the delay issue is gone.

## 10.2 Application Insight cannot use private endpoint

This issue has been confirmed by Microsoft and Manulife with this Microsoft ticket ‘TrackingID#2309040030000984 - Facing an issue on setting up application insight with the private endpoint’, after confirming the issue, Manulife decided to use public endpoints instead.

## 10.3 Application Insight Error - Field 'time' on type 'Envelope' is older than the allowed min date

This application insight issue is hit during the deployment, upgrade the application insight agent from 3.4.15 to 3.4.17 to resolve the issue.

Reference:

<https://github.com/microsoft/ApplicationInsights-Java/issues/3235>

# 11. Engaging Red Hat Global Support Services

More information on how to engage support can be found at:

<https://access.redhat.com/start/how-to-engage-red-hat-support>

In some cases, it has been found that your questions or challenges may have been seen already. In this scenario, either Red Hat or a Client teammate has documented the challenge and resolution. To expedite your search on areas specific to Red Hat-based solutions, please visit Red Hat Knowledgebase:

<https://access.redhat.com/search/#/>

If you are unable to find what you are looking for, please feel free to engage Red Hat's Global Support Services (GSS).

To expedite your support request, it would be helpful to have the following prior to engaging GSS:

* Define the Problem. Please include use cases/scenarios. For example, “The server is used for batch processing and runs at a desired rate up through # of jobs. After that, server performance reduces by X.”
* Gather Background Information. For example, the application stack, and drivers, of the server or workstation itself along with servers or peripherals that interact with the server in question.
* Gather Relevant diagnostic information.
* Determine the severity level (1-4). For severity level definitions, please visit

<https://access.redhat.com/support/policy/severity>

* Ensure you have an RHN Login or your account number.

If you have a Technical Account Manager (TAM), please initiate/update support via the dedicated Issue Tracker queue or call your TAM directly.

For *Severity 1,* it is highly recommended to call us immediately after you have initiated a ticket.