New Relic Infrastructure Database Integration

The New Relic Infrastructure Database Integration is a standalone Java application that uses JDBC to extract telemetry from a variety of relational database management systems.

Compatibility

The following database types are supported.

Database Vendor	JDBC Driver Class	Driver Packaged?	Provider ID
IBM AS/400	`com.ibm.as400.access.AS400JDBCDriver`	N	AS400
IBM Db/2	`com.ibm.db2.jcc.DB2Driver`	N	DB2
Oracle	`oracle.jdbc.driver.OracleDriver`	N	oracle
MSSQL	`com.microsoft.sqlserver.jdbc.SQLServerDriver`	N	MSSQL
MySQL	`com.mysql.cj.jdbc.Driver`	N	MySQL
Postgres	`org.postgresql.Driver`	Y	Postgres
HSQLDB	`org.hsqldb.jdbc.JDBCDriver`	Y	HSQLDB

Installation

There are three deployment options for the New Relic Infrastructure Database Integration (hereafter just `nri-db`).

1. On-host: The Java application is run directly on a host as a native process
2. Docker: The Java application is run inside a Docker container deployed to a container service (e.g. AWS ECS) using a docker-compose file
3. Kubernetes: The Java application is run as a deployment in a Kubernetes cluster

The following steps are required for *all* deployment options.

1. Download and extract the latest release from this repository.

   For On-host deployments, if deploying to a host manually, perform this steps directly on the host. For Docker or Kubernetes deployments, or if deploying on-host using an automation tool such as Ansible, perform this step locally to prepare the configuration files, images, etc.

2. Setup an encryption password

3. Encrypt the database password

4. (Optional) Encrypt the trust store password if connecting to databases using SSL

On-host

1. Setup the configuration file
2. Setup the database command file(s)
3. Deploy the latest release to the host if not already deployed
4. Copy the configuration file to `config/plugin.json`
5. Copy the database command file(s) to the appropriate directory
6. Run the integration

Docker

1. Setup the configuration file

2. Setup the database command file(s)

3. Build the Docker image, specifying an appropriate tag for your deployment service, the local path to the JDBC driver for your database, and the name of the JDBC driver Jar.

   ```
   docker build -t name:tag . --build-arg db_driver_path=/path/to/dbdriver.jar --build-arg db_driver_jar=dbdriver.jar
   ```

   When using a single `nri-db` container to access databases from multiple vendors, manual customization of the `Dockerfile` will be necessary in order to add multiple driver JARs to the image and to the `CLASSPATH`. See Using Multiple Databases With The `Dockerfile`

4. Create a `.env` file in the project root with the following contents

   ```
   NRI_DB_NAME_TAG=name:tag
   ```

   where `name:tag` is the tag used to build the image in the previous step

5. Follow the instructions from your cloud provider for deploying Docker containers. For AWS ECS, you can use the docker-compose CLI ECS integration.

Kubernetes

Deployment to Kubernetes is done via a Helm chart.

1. Build a Docker image as outlined above

2. Setup the Helm values file

3. Install the Helm chart by executing the following command from the project directory root

   ```
   helm install -f /path/to/values.yaml nri-db ./helm/nri-db
   ```

Usage

Password Encryption

The New Relic Infrastructure Database Integration uses password based encryption to encrypt passwords in the configuration file. Password based encryption uses an alphanumeric password to encrypt and decrypt data.

During setup, the encryption password is used by the included `encrypt-password` tool to encrypt the passwords for the configuration file. At runtime, the encryption password is used to decrypt the passwords prior to executing operations that require a password.

In both cases, the encryption password can either be specified as an environment variable or specified in a Java properties file named `.nridbrc` in the directory from which the integration is launched.

Setup an encryption password

Before any passwords can be encrypted, an encryption password must be established. You can choose your own password or generate one using the `encrypt-password` tool.

Generate a random encryption password

There are two ways to generate a random encryption password. The method you use depends on whether you plan to specify the encryption password at runtime via an environment variable of the `.nridbrc` file.

1. To generate an encryption password and create the `.nridbrc` file at the same time, simply invoke the `./bin/encrypt-password` command.
2. To generate an encryption password for use as an environment variable, invoke the command `./bin/encrypt-password --generate`. A random encryption password will be generated and output to the screen. Save the value for later use.

Choose your own password

If you plan to specify the encryption password as an environment variable, no further action is necessary. If you plan to specify the encryption password via the `.nridbrc` file, create a file named `.nridbrc` within the project root directory with the following format.

```
encryptionPassword=YOUR_ENCRYPTION_PASSWORD_HERE
```

Encrypt passwords

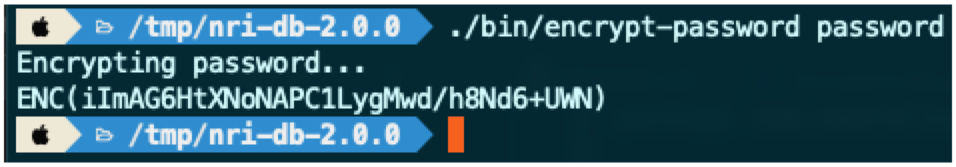
The `encrypt-password` tool is used to encrypt passwords for use within the configuration file. The password to encrypt can be specified either on the command line or using a password prompt. The specified password will be encrypted using the encryption password and the resulting encrypted value will be output to the console.

The encryption password will be taken from either the environment variable named `NRIDB_ENCRYPTION_PASSWORD` or, if no value exists or the value is empty, from a file named `.nridbrc` in the current directory. If no such file exists, the tool will create the file with a random password and exit. You must run it again to actually encrypt the password.

To encrypt a password by specifying it at the command line, execute the following command from the project root directory.

```
./bin/encrypt-password YOUR_PASSWORD_HERE
```

The screenshot below shows an example of encrypting the password `password` using the encryption key 12345 by specifying the password as an argument at the command line.

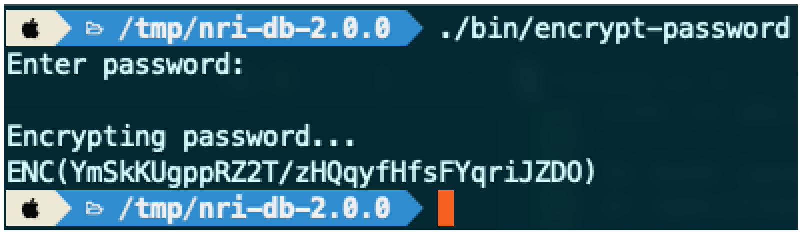


```
/tmp/nri-db-2.0.0  ./bin/encrypt-password password
Encrypting password...
ENC(iImAG6HtXNoNAPC1LygMwd/h8Nd6+UWN)
/tmp/nri-db-2.0.0
```

To encrypt a password using a secure password prompt, execute the `encrypt-password` tool with no arguments from the project root directory as follows.

```
./bin/encrypt-password
```

The screenshot below shows an example of encrypting the password `password` using the encryption key 12345 using the secure password prompt.



```
/tmp/nri-db-2.0.0  ./bin/encrypt-password
Enter password:

Encrypting password...
ENC(YmSkKUgppRZ2T/zHQqyfHfsFYqriJZDO)
/tmp/nri-db-2.0.0
```

Integration Configuration

The New Relic Infrastructure Database Integration configuration file consists of two main parts: the New Relic connections settings and a list of "agent instances". The sample configuration file shows an example of all possible settings.

Connection settings

The `global` section of the integration configuration file contains the settings used to connect to New Relic and insert data via the Event API. The section takes the following format.

```
{
  "global": {
    "account_id": "insert_your_RPM_account_ID_here",
    "insights_mode": {
      "insights_insert_key": "insert_your_insights_insert_key_here"
    },
    "proxy": {
      "proxy_host": "enter_proxy_host",
      "proxy_port": 8080,
      "proxy_username": "enter_proxy_username",
      "proxy_password": "enter_proxy_password"
    }
  },
  "agents": [
    ...
    ]
  }
```

The available settings and their meanings are as follows.

Valid connection settings

Setting	Description
account_id	A New Relic account ID to which to send telemetry
insights_mode.insights_insert_key	A New Relic insights insert key / license key
proxy.proxy_host	If a proxy is required to connect to New Relic, the proxy hostname
proxy.proxy_port	If a proxy is required to connect to New Relic, the proxy port
proxy.proxy_username	If an authenticated proxy is required to connect to New Relic, the proxy username
proxy.proxy_password	If an authenticated proxy is required to connect to New Relic, the proxy password

Agent instances

The `agents` section of the integration configuration file contains a list of "agent instances". Each agent instance is a defined by a configuration consisting of the connections settings of a database to connect to along with the path to a database command file. The section takes the following format.

```
  {
    "global": {
      ...
    },
    "agents": [
      {
        "name": "INSTANCE NAME",
        "host": "HOST",
        "port": 12345,
        "username": "DB USER",
        "password": "ENCRYPTED PASSWORD",
        "inputfile": "PATH TO QUERY JSON FILE",
      },
      ...
      {
        "name": "INSTANCE NAME 2",
        "host": "HOST",
        "port": 12345,
        "username": "DB USER",
        "password": "ENCRYPTED PASSWORD",
        "inputfile": "PATH TO QUERY JSON FILE",
        "sslConnection": true,
        "sslTrustStoreLocation": "TRUST STORE LOCATION",
        "sslTrustStorePassword": "ENCRYPTED TRUST STORE PASSWORD",
        "static": {
          "foo": "bar",
          "beep": "bop"
        }
      }
    ]
```

The available settings and their meanings are as follows.

Valid agent instance settings

Setting	Description	Type	Required?	Default
name	A name for the agent instance. This is *not* the database name. It is used in the event data sent to New Relic and can be used to query different database samples via NRQL.	string	Y	n/a
host	The hostname of the database to which to connect	string	Y	n/a
port	The port of the database to which to connect	integer	Y	n/a
username	The username to use to authenticate to the database	string	Y	n/a
password	The password to use to authenticate to the database	string	Y	n/a
inputfile	The path to the database command file	string	Y	n/a
sslConnection	Whether or not to use secure sockets when connecting to the database	boolean	N	false
sslTrustStoreLocation	The path to the database command file	string	Y if sslConnection = true	''
sslTrustStorePassword	The path to the database command file	string	Y if sslConnection = true	''
static	An set of key/value pairs to add to every event for this instance	object	N	null

Database Command File

Each agent instance must specify a database command file. A database command file consists of a list of queries to run. Each query is specified using a configuration consisting of the query to run along with a name for the query and the database name and provider. The file takes the following format.

```
  [
    {
      "query" : "select * from pg_stat_activity",
      "name" : "Stat Activity",
      "type" : "metric",
      "database" : "postgres",
      "provider" : "Postgres"
    },
    ...
    {
      "query" : "select * from pg_user",
      "name" : "Archive Files",
      "type" : "metric",
      "database" : "postgres",
      "provider" : "Postgres"
    }
  ]
```

The available settings and their meanings are as follows.

Valid query configuration settings

Setting	Description	Type	Required?	Default
name	A name for the query. This is used only in the event data sent to New Relic and can be used to query different query results via NRQL.	string	Y	n/a
query	The SQL query to run	string	Y	n/a
type	This field should always be set to `metric` ^	string	Y	n/a
database	The name of the database to query	string	Y	n/a
provider	The database provider ID (see Compatibility)	string	Y	n/a
metricType	The type of metric, either `Gauge`, `Delta` or `Rate` ^^	string	N	Gauge
queryOptions	Collection of options used in the query ^^^	object	N	null
eventType	The name of the custom event	string	N	the database provider ID
parser	Class of custom result parser to load (must be in the class path)	string	N	null
parserOptions	JSON to pass to the custom parser for configuration	object	N	null
deduplicate	Wether or not to attempt row-level deduplication based on MD5 hash	boolean	N	false
uniqueHistorySize	Number of unique row hashes to keep	integer	N	10000
rowBufferSize	uffer size for deduplication hash	integer	N	5120

^ The `inventory` type is no longer supported as this package no longer supports "Infrastructure mode".

^^ The `metricType` attribute defines the data type that will be used by the agent. This is an optional attribute. The default value is "Gauge", which is the "real" number reported. The other supported values are:

- Gauge: Just the absolute number
- Delta: Number as compared to the previous number
- Rate: Calculated Rate

These values only apply to numeric metrics. All the string/text values are considered "attribute metrics" and will be saved as string attributes on the event.

In addition, the following guidelines should be followed.

- If possible, return single numbers in the queries where `Delta` or `Rate` will be used
- Provide "readable" names using aliases whenever possible to get better attribute names in the custom events, especially when running functions on SQL (count(), sum(), avg(), etc)

^^^ The following query options are supported.

Name	Description
initialQuery	Query to run at startup time. The goal is to initialize the columns below for use in query that is parameterized.
queryParameterColumns	Array of column names returned by **BOTH** the `initialQuery` and the main `query`. The last value returned will be used as the parameter for the next query run. The order of the array items matters.

The following is an example of a minimal agent instance configuration.

```
{
  "name" : "Stat Activity",
  "provider" : "Postgres",
  "query" : "select * from pg_stat_activity",
  "type" : "metric",
  "database" : "test"
}
```

The following is an example of a full agent instance configuration.

```
{
  "name" : "Stat Activity",
  "provider" : "Oracle",
  "query" : "SELECT ID, ErrorMessage FROM MyTable WHERE ID > ? ORDER BY ID ASC",
  "type" : "metric",
  "database" : "test",
  "metricType": "Gauge",
  "queryOptions": {
    "initialQuery": "select max(id) ID from MyTable",
    "queryParameterColumns": [
      "ID"
    ]
  },
  "parser": "my.custom.result.parser.class",
  "parserOptions": {
    "ThisJSON": "Passed to the Parser"
  },
  "deduplicate": true,
  "uniqueHistorySize": 5000,
  "rowBufferSize": 10000
}
```

Helm Values File

For Kubernetes deployments, a Helm chart is provided to install a deployment and the supporting Kubernetes resources required to run nri-db in a cluster. As with most Helm charts, a Helm Values file can be provided to specify the Helm values used in the chart. The default set of values are provided in the values.yaml file.

The settings underneath the line `# Kubernetes resource settings` are values that can be used to customize various aspects of the actual Kubernetes resources created when the chart is installed. These are not documented here and in general require a knowledge of Kubernetes to customize.

The section underneath the line `# nri-db application settings` are the values used to customize the `nri-db` application itself. These settings correspond to those specified in the integration configuration and the database command file and to the encryption password. Refer to the referenced sections when customizing the values file.

The following is an example of a values file with customized settings for the `nri-db` application settings.

```
# ----------------------------------------------------------------------------
# nri-db application settings

encryptionPassword: "12345"
pluginConfig:
  accountId: "1"
  insertKey: "NRAK-XXXXXXXXXXXX"
  agents:
  - name: INSTANCE NAME
    host: HOST
    port: 12345
    username: DB USER
    password: ENCRYPTED PASSWORD
    inputfile: inputs/input1.json
  - name: INSTANCE NAME 2
    host: HOST
    port: 12345
    username: DB USER
    password: ENCRYPTED PASSWORD
    inputfile: inputs/input2.json
    sslConnection: true
    sslTrustStoreLocation: TRUST STORE LOCATION
    sslTrustStorePassword: ENCRYPTED TRUST STORE PASSWORD
    static:
      foo: bar
      beep: bop
  inputs:
  - name: input1.json
```

```
    queries:
    - name: Stat Activity
      provider: Postgres
      query: select * from pg_stat_activity
      type: metric
      database: test
  - name: input2.json
    queries:
    - name: Stat Activity
      provider: Oracle
      query: 'SELECT ID, ErrorMessage FROM MyTable WHERE ID > ? ORDER BY ID ASC'
      type: metric
      database: test
      metricType: Gauge
      queryOptions:
        initialQuery: select max(id) ID from MyTable
        queryParameterColumns:
          - ID
      parser: my.custom.result.parser.class
      parserOptions:
        ThisJSON: Passed to the Parser
      deduplicate: true
      uniqueHistorySize: 5000
      rowBufferSize: 10000
```

Using Multiple Drivers With The `Dockerfile`

If databases from multiple database vendors need to be accessed from within a single Docker container, manual customization of the `Dockerfile` is necessary.

For each database vendor, the appropriate driver must be added to the `/app/nri-db/lib` directory and the path to the driver JAR file must be appended to the CLASSPATH environment variable. The following examples shows how to create an image using 2 different database drivers.

```
FROM openjdk:11

# No need for these since we are manually modifying anyway
#ARG db_driver_path
#ARG db_driver_jar

RUN mkdir /app

ADD . /app/nri-db
ADD ./.nridbrc /root
ADD /path/to/dbdriver1.jar /app/nri-db/lib
ADD /path/to/a/different/dbdriver2.jar /app/nri-db/lib

RUN chmod 0400 /root/.nridbrc

ENV CLASSPATH=/app/nri-db/lib/dbdriver1.jar:/app/nri-db/lib/dbdriver2.jar

WORKDIR /app/nri-db
```

```
CMD ["./bin/nri-db"]
```

Running the Integration On Host

For On-host deployments, the nri-db application process must be running at all times. The easiest way to ensure this on Linux based distributions is to install one of the operating system startup services. On Windows, the best option is probably to use Docker. Another option is to use a tool like NSSM to create a Windows service to execute the service using a shell script

Linux Startup Services

Systemd

The file `install/nri-db.service` contains a Systemd service unit definition for running the `nri-db` application process. To install this service unit, perform the following steps.

1. Edit the `install/nri-db.service` file as follows
   1. Update the value for the `WorkingDirectory` property from `@installdir@` to the absolute path to the `nri-db` installation directory. For example,

      ```
      WorkingDirectory=/usr/local/software/nri-db
      ```

   2. Update the value for the `CLASSPATH` in the `Environment` property from `@dbdriverpath@` to the absolute path of the database driver. For example,

      ```
      Environment="JAVA_OPTS=-Xmx512m CLASSPATH=/usr/local/db2/db2jcc.jar"
      ```

   3. Optionally update the value for the `JAVA_OPTS` in the `Environment` property with any additional Java options.
2. Move the updated `install/nri-db.service` file into `/etc/systemd/system` For example,

   ```
   sudo mv ./install/nri-db.service /etc/systemd/system
   ```

3. Run the following commands

   ```
   sudo systemctl daemon-reload
   sudo systemctl start nri-db.service
   sudo systemctl enable nri-db.service
   ```

Upstart

The file `install/nri-db.conf` contains an Upstart job configuration file for running the `nri-db` application process. To install this job configuration, perform the following steps.

1. Edit the `install/nri-db.conf` file as follows:
   1. Update the value for the `chdir` stanza from `@installdir@` to the absolute path to the `nri-db` installation directory. For example,

```
chdir /usr/local/software/nri-db
```

   2. Update the value for the CLASSPATH in the first env stanza from @dbdriverpath@ to the absolute path of the database driver. For example,

      ```
      env CLASSPATH=/usr/local/db2/db2jcc.jar
      ```

   3. Optionally update the value for the JAVA_OPTS in the second env stanza property with any additional Java options.

2. Move the updated install/nri-db.conf file into /etc/init For example,

   ```
   sudo mv ./install/nri-db.conf /etc/init
   ```

3. Run the following commands

   ```
     sudo initctl reload-configuration
     sudo initctl start nri-db
   ```

Manual Execution

The integration can also be run manually with a few simple commands.

Linux

To run the integration on Linux, execute the following commands.

```
export CLASSPATH=/path/to/dbdriver.jar:$CLASSPATH
cd /path/to/nri-db-installdir
./bin/nri-db
```

Alternately copy the following shell script into a file and make the file executable. Then the integration can be run at anytime with a single command.

```
#!/bin/bash
# Run nri-db

export CLASSPATH=/path/to/dbdriver.jar:$CLASSPATH

cd /path/to/nri-db-installdir

./bin/nri-db
```

Windows

To run the integration on Microsoft Windows, execute the following commands.

```
set CLASSPATH=C:\path\to\dbdriver.jar;%CLASSPATH%
cd C:\path\to\nri-db-installdir
.\bin\nri-db
```

Alternately copy the following shell script into a file and make the file executable. Then the integration can be run at anytime with a single command.

```
@rem Run nri-db

set CLASSPATH=C:\path\to\dbdriver.jar;%CLASSPATH%

cd C:\path\to\nri-db-installdir

.\bin\nri-db
```

Building

This project uses gradle with a generated gradle wrapper. To run a build, execute the following command from the root of the project.

```
./gradlew clean build
```

Testing

This project uses JUnit 4 for testing. To run all tests, execute the following command from the root of the project.

```
./gradlew cleanTest test
```

Integration Testing

The following sections document how to create local Docker instances running different databases that can be used for integration testing.

MySQL

```
docker run --rm --name mysql -e MYSQL_ROOT_PASSWORD=root -d -p 3306:3306 mysql:latest
```

Postgres

```
docker run --name postgres -e POSTGRES_PASSWORD=root -d --rm -p 5432:5432 postgres
```

DB/2

```
docker run -itd --name db2 --privileged=true -p 50000:50000 -e LICENSE=accept -e DB2INS
```

Troubleshooting

Logging

This project uses Java Util Logging for generating logs. To generate debug logs, uncomment the following line in the file logging.properties and restart the integration.

```
...
#com.newrelic.infra.db.level = FINEST
```

Logs will be output to the console and to the logs directory.

Support

New Relic has open-sourced this project. This project is provided AS-IS WITHOUT WARRANTY OR DEDICATED SUPPORT. Issues and contributions should be reported to the project here on GitHub.

We encourage you to bring your experiences and questions to the Explorers Hub where our community members collaborate on solutions and new ideas.

Contributing

We encourage your contributions to improve the New Relic Infrastructure Database Integration! Keep in mind when you submit your pull request, you'll need to sign the CLA via the click-through using CLA-Assistant. You only have to sign the CLA one time per project.

If you have any questions, or to execute our corporate CLA, required if your contribution is on behalf of a company, please drop us an email at opensource@newrelic.com.

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