VMWARE VREALIZE END POINT OPERATIONS FOR
IBM DB2

User Guide
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NOTE: This document supports the version of each product listed, as well as all subsequent versions, until a new edition replaces it.

You can find the most up-to-date technical documentation on the Blue Medora support site at: http://support.bluemedora.com.

The Blue Medora website also provides the latest product updates. If you have comments about this documentation, submit your feedback to: support@bluemedora.com.
1. Product Overview

The Blue Medora VMware vRealize End Point Operations agent for IBM DB2 collects performance data from IBM DB2 database resources and makes it available within VMware vRealize Operations (vROps).

2. Product Version Information

<table>
<thead>
<tr>
<th>VERSION</th>
<th>RELEASE DATE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3.1010004</td>
<td>March 16, 2017</td>
<td>Initial release by Blue Medora</td>
</tr>
</tbody>
</table>

3. Known Issues/Limitations

None at this time.

4. System Requirements

Before installing the End Point operations for IBM DB2, ensure your system meets the following requirements:

Table 1: System Requirements

<table>
<thead>
<tr>
<th>Operating System (OS)</th>
<th>vRealize Operations (vRops)</th>
<th>IBM DB2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Windows</td>
<td>vRealize Operations v6.3+</td>
<td>IBM DB2 9.5+</td>
</tr>
<tr>
<td>• Linux</td>
<td></td>
<td>DB2 User Name/Password</td>
</tr>
</tbody>
</table>

NOTE: See section “5 Setting IBM DB2 User Privileges” for details on creating a least-privileged DB2 monitoring user.

5. Setting IBM DB2 User Privileges

5.1 Creating a DB2 Least-Privileged User (LPU) on Windows

**Prerequisite:** Create a Windows user group (as an example, we used SYSMONG) to be granted the SYSMON_GROUP privilege, then add a monitoring user to that group.

**NOTE:** In the process outlined below, IBM Data Studio is being used.

5.1.1 Add a New Database Connection

1. In the left pane of IBM Data Studio, right-click on All Databases and select New Database.
2. In the New Connection window:
   - Select the Local tab and ensure that DB2 for Linux, UNIX, and Windows is highlighted.
   - Enter the appropriate configuration properties (host, user name, password) for the new database connection.

3. Click Finish.

5.1.2 Configure the Database Connection
1. Right-click on the newly-created database connection from the list on the left, then select Configure.
2. In the Configuration Parameters tab, locate the SYSMON_GROUP in the list. The value cell will be empty. Enter the name of the group in that cell (NOTE: In this example, 'sysmong' is the group name.).

![Configuration Parameters](image)

3. Scroll to top of the page and click Run for the changes to take effect.

![Run Button](image)

The entry will then show as changed in the list.

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Pending Value</th>
<th>Automatic</th>
<th>Immediate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSMON_GROUP</td>
<td>SYSMONG</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

4. Back in the main Data Studio window, right-click on the database connection, then select Stop.

![Data Studio Window](image)

**NOTE:** If this is the first time the database has been stopped, you will have to enter your credentials first.
5. Click *Run* to Stop the instance.

**NOTE:** Select whether you want to force quit any connected applications when you stop the instance. You may want to shut down the database applications manually first before clicking *Run*.

6. Wait until the database connection shows as stopped.

7. Back in the main Data Studio window, right-click on the database connection, then select *Start*.

8. Click *Run* to start the database connection.
5.1.3 Creating DB2 Least-Privileged User (LPU) on Linux

**NOTE:** User Name must be <= 8 characters and OS Group must be all lowercase.

1. Starting as the root user on Linux, enter the following commands:
   ```bash
   groupadd <system-monitoring-group-name>
   useradd -g <system-monitoring-group-name> <monitoring-user-name>
   passwd <monitoring-user-name>
   
   Example:
   ```
   groupadd sysmong
   useradd -g sysmong db2lpu
   passwd db2lpu
   ```

2. Switch to the instance master user. In the example below, `db2inst1` for instance 1.
   ```bash
   su - db2inst1
   ```

3. Grant the needed permissions by setting the OS group as the SYSTEMON_GROUP:
   ```bash
   db2 update dbm cfg using SYSTEMON_GROUP <system-monitoring-group-name>
   
   Example:
   ```
   db2 update dbm cfg using SYSTEMON_GROUP SYSMONG
   ```

4. Exit from the master user back to root:
   ```bash
   exit
   ```

5. Reboot the server, then log in again as root. Copy the `.bashrc` from master user to the `<monitoring-user-name>` in order to get the environment variables that make DB2 work.
   ```bash
   cp -f /home/db2inst1/.bashrc /home/db2lpu/ && chown db2lpu:sysmong /home/db2lpu/.bashrc
   ```

6. Test the permissions:
   - Log in as `<monitoring-user-name>`.
   - Connect to a database (Note: Here we’re connecting to sample):
     ```bash
     db2 connect to sample
     ```

7. Enter the DB2 shell:
   ```bash
   db2
   ```

8. Run our queries from the DB2 shell to test that they all return successfully.
   ```sql
   SELECT coalesce((sum(DATA_LOGICAL_READS) - sum(DATA_PHYSICAL_READS)) / nullif(cast(sum(DATA_LOGICAL_READS) as float), 0), 1) * 100 as buffer_pool_data_hit from SYSIBMADM.BP_HITRATIO group by db_name, snapshot_timestamp
   
   SELECT COUNT(locks_waiting) as applications_waiting_on_locks from SYSIBMADM.SNAPAPPL WHERE LOCKS_WAITING > 0
   
   SELECT LOG_UTILIZATION_PERCENT AS log_utilization from SYSIBMADM.LOG_UTILIZATION
   
   SELECT TOTAL_CONS, DEADLOCKS, LOCK_TIMEOUTS, APPLS_IN_DB2 FROM SYSIBMADM.SNAPDB
   
   SELECT LOCAL_CONS, REM_CONS_IN FROM SYSIBMADM.SNAPDB
   ```
6. Installing End Point Operations for IBM DB2

To successfully install End Point Operations for IBM DB2, you must first install the End Point Operations Management agent on your DB2 host machines, then upload the EP Ops for IBM DB2 installation file in vRealize Operations.

6.1 Prerequisites

Obtain the End Point Operations for IBM DB2 installation (.pak) file from the VMware Solution Exchange.

6.2 Installing the End Point Operations Management Agent

Install the End Point Operations Management agent on your IBM DB2 host machines. For instructions, refer to VMware's online help for your specific version of vRealize Operations:

- vROps version 6.3: End Point Operations Management Agent Installation and Deployment
- vROps version 6.4: End Point Operations Management Agent Installation and Deployment
- vROps version 6.5: End Point Operations Management Agent Installation and Deployment

**NOTE:** When you install the End Point Operations Management agents on a distributed system, ensure that you install the agent on every machine that you would like to monitor.

6.3 Uploading the Installation (.pak) file in vRealize Operations

1. Save the .pak file in a temporary location.
2. Log in to vRealize Operations as an admin user.
3. In the left pane, select Administration, then click Solutions.
4. In the right panel, the Solutions list will be displayed.
5. Click the Add icon (+). In the Add Solution dialog that appears, browse to the location of the saved .pak file, then click Upload.
6. Read and accept the *End User License Agreement (EULA)*, then click *Next*. The upload might take several minutes to complete. Status information appears in the Installation Details text box throughout the installation process.

7. Click *Finish* when the installation process is complete.

6.4 What to do next

After End Point Operations for IBM DB2 has been installed, configure your DB2 credentials. vRealize Operations Manager will discover and monitor the objects that belong to the plug-ins.
### 7. Configuring IBM DB2 Credentials

After the End Point Operations for IBM DB2 .pak file has been installed, you must configure the credentials of the DB2 instance in order to collect performance data.

#### 7.1 Prerequisites

Wait for vRealize Operations Manager to complete one collection cycle so that the installed agent can be discovered.

#### 7.2 Procedure

1. In the left pane of vRealize Operations Manager, click **Administration**, then **Inventory Explorer**.
2. Click **Adapter Types > EP Ops Adapter**.
3. Select the IBM DB2 database for which you want to collect metrics, then click the **Edit Object (pencil)** icon. The Edit Object dialog box opens.

![vRealize Operations Manager Inventory Explorer](image-url)
4. Click on the Add New plus sign beside Credentials. The Manage Credential dialog box will appear.
5. Enter the Credential details, then click OK.
   - DB2 User Name
   - DB2 Password

7.3 Changes to Advanced Settings or Credentials while an EP Ops Agent is running

Once the IBM DB2 EP Ops agent is running, any changes to Advanced Settings (e.g., port, host) require the Override agent configuration data setting to be set to True.

Credential addition/changes do NOT require the Override agent configuration data setting to be set to True. However, credential changes do require the End Point Operations Management agent be restarted to take full effect.

Changing the credentials of a running EP Ops agent instance in vROps causes multiple instances of the agent to be running on the target host. Therefore, whenever a customer needs to change their credentials (except when setting them for the first time), the customer will need to access the target host, navigate to the End Point Operation Management agent’s install directory, and restart the agent.

To restart the Management agent, perform the following commands:

**Linux (terminal):**

```
<agent-install-path>/bin/ep-agent.sh restart
```

**Windows (command prompt):**

```
<agent-install-path>\bin\ep-agent.bat restart
```

7.4 What to do next

Now that the credentials for your IBM DB2 instance have been configured, your End Point Operations for IBM DB2 agent should start returning performance metrics for the database(s) on the configured host. Navigate to your Dashboard List and select the *IBM DB2 End Point Agent Overview* dashboard.
8. IBM DB2 End Point Agent Overview Dashboard

End Point Operations for IBM DB2 includes the following out-of-the-box overview dashboard. Select a database from the IBM DB2 Selector widget on the left to view its key performance metrics on the right.

**NOTE:** Additional DB2-related resources, metrics, dashboards, query analysis, and alerts can be found in the IBM DB2 Management Pack for vROps. Click on the orange *Learn More* button for more information.

![IBM DB2 Management Pack](image_url)

9. Metrics

The following metrics are collected by the End Point Operations solution for IBM DB2.

*Table 2: IBM DB2 Metrics*

<table>
<thead>
<tr>
<th>RESOURCE KIND</th>
<th>RESOURCE GROUP</th>
<th>RESOURCE ATTRIBUTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Active Applications</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Applications Connected</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Applications Waiting on Locks</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Buffer Pool Data Hit</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Deadlocks</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Local Connections</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Lock Timeouts</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Log Utilization</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Remote Connections</td>
</tr>
<tr>
<td>IBM DB2 Database</td>
<td>UTILIZATION</td>
<td>Total Connections</td>
</tr>
</tbody>
</table>
10. Troubleshooting

10.1 Created User Cannot Connect to Database

**Issue:** Created user cannot connect to database.

**Symptom:** The following log message is observed:

```
10-02-2017 13:38:51,780 EST ERROR [CollectorThread] [DatabaseCollector]
[collect] Error getting metrics: [jcc][t4][2010][11246][4.19.26] Connection
authorization failure occurred. Reason: Local security service non-retryable
error. ERRORCODE=-4214, SQLSTATE=28000
```

**Symptom:** Manually connecting to the database yields this error:

```
> db2 connect to sample user db2lpu using password
SQL30082N Security processing failed with reason "15" ("PROCESSING FAILURE").
```

**Root cause:** The db2lpu user was created with a password using SHA, which can be a problem when authenticating a DB2 connection.

**Solution:** Create the db2lpu password using `chpasswd` and the `-m` (md5) command-line argument:

```
echo "db2lpu:password" | chpasswd -m
```

10.2 Debugging DB2 Least-Privileged User

Below is a non-query (OS Command) way to prove if your user is in the SYSMON_GROUP:

```
db2pd
```

Alternatively, you can log in to the database as an administrator and run the following queries:

```
SELECT AUTHORITY, D_USER, D_GROUP, D_PUBLIC, ROLE_USER, ROLE_GROUP, ROLE_PUBLIC,
D_ROLE from TABLE (SYSPROC.AUTH_LIST_AUTHORITIES_FOR_AUTHID ('DB2LPU', 'U') ) AS T ORDER BY AUTHORITY
```

```
SELECT AUTHORITY, D_USER, D_GROUP, D_PUBLIC, ROLE_USER, ROLE_GROUP, ROLE_PUBLIC,
D_ROLE from TABLE (SYSPROC.AUTH_LIST_AUTHORITIES_FOR_AUTHID ('SYSMONG', 'G') ) AS T ORDER BY AUTHORITY
```

10.3 Viewing Errors in the Agent Log File

You can review EP Ops agent errors in the `agent.log` file, which can be viewed in the vROps user interface or in an external log viewer. The log file can be found at `$VCOPS_BASE/user/log/agent.log`. 
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