

Oracle® Enterprise Manager

Oracle Enterprise Manager App for Grafana

User's Guide



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The Oracle logo, consisting of a solid red square with the word "ORACLE" in white, uppercase, sans-serif font centered within it.

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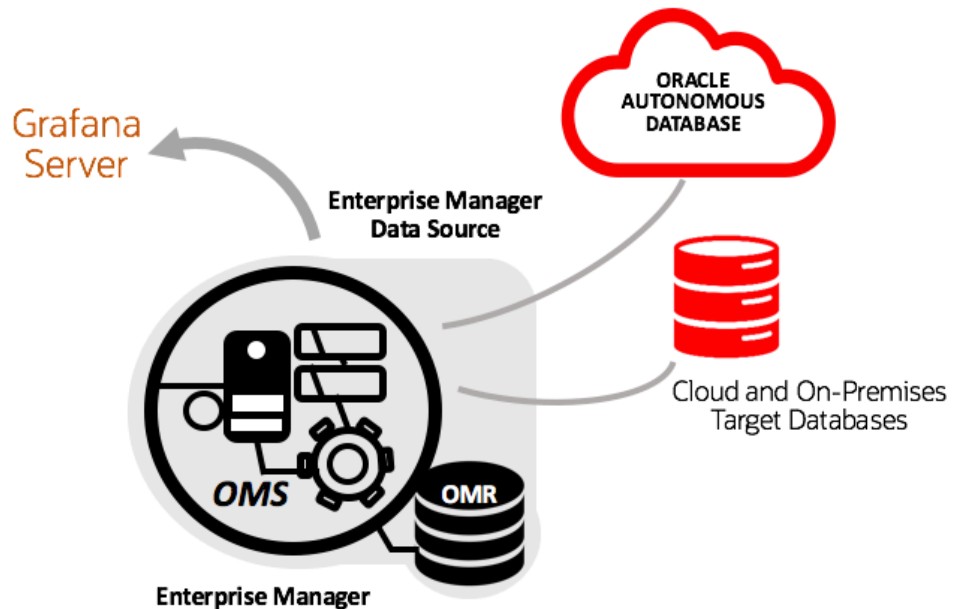
1

About the Oracle Enterprise Manager App for Grafana

Grafana is an open source technology used for metric analytics & visualization. The Oracle Enterprise Manager App for Grafana allows you to integrate Enterprise Manager's metric data (collected from multiple managed targets and stored in the Enterprise Manager repository) with any other data sources you may have access to. You can create custom Enterprise Manager-based Grafana dashboards by simply browsing and selecting the Enterprise Manager metrics of interest, or running simple SQL queries against the Enterprise Manager repository tables, without a deep knowledge of the Enterprise Manager data model. Data from multiple Enterprise Manager sites, along with data from other data sources, can be easily displayed on a single dashboard.

Deployment

When deployed, the Oracle Enterprise Manager App for Grafana lets Enterprise Manager become a data source for Grafana. The Enterprise Manager Oracle Management Service (OMS) is in direct communication with the Grafana server, transferring target metric and configuration data stored in the Oracle Management Repository (OMR).



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Before You Begin

Before you install and configure the Oracle Enterprise Manager App for Grafana, make sure the following prerequisites are met:

- Ensure you have a **Grafana Server** that has connectivity with the Enterprise Manager OMS and Repository. Set or make a note of your Grafana home directory (`$GRAFANA_HOME`) where your Grafana binary exists. Grafana Enterprise 7.1.1 or later is supported for V2.0.0 for Oracle Enterprise Manager App for Grafana; For more details, see [Oracle Enterprise Manager App for Grafana download page](#).

 **Note:**

For information on platforms for which the Oracle Enterprise Manager App for Grafana is certified, see [Oracle Enterprise Manager App for Grafana download page](#).

- Install and configure **Oracle Enterprise Manager Cloud Control 13.4 Release Update 7 and above**. For details see Installation of Enterprise Manager Cloud Control and Advanced Installation and Configuration. Make a note of your OMS home directory.
- Save the **Oracle Enterprise Manager App for Grafana** file from the [Oracle Enterprise Manager App for Grafana download page](#).

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Install the Oracle Enterprise Manager App for Grafana

You can install the Oracle Enterprise Manager App for Grafana using the Grafana command line interface (preferred) or manually.

Using the Grafana CLI

1. Navigate to `$(GRAFANA_HOME)/bin`
2. Install the Oracle Enterprise Manager App for Grafana.
Using `--pluginUrl` option through `grafana-cli`

```
./grafana-cli --pluginUrl <FULL_PATH>/oracle-emcc-app-<VERSION>.zip  
plugins install oracle-emcc-app
```

Example:

```
grafana-cli --pluginUrl /var/lib/grafana/plugins/emgrafana/work/  
oracle-emcc-app-1.0.0.zip plugins install oracle-emcc-app
```

3. Restart the Grafana server.

```
cd $(GRAFANA_HOME)/bin  
./grafana-server
```

Without the Grafana CLI

1. Navigate to the Grafana *plugins* directory.
2. Extract the content of the Oracle Enterprise Manager App for Grafana zip file in the Grafana *plugins* directory. Create this directory if one does not exist.

```
cd $(GRAFANA_HOME)/data/plugins  
unzip <EM App for Grafana>.zip
```

3. Restart the Grafana server.

```
cd $(GRAFANA_HOME)/bin  
./grafana-server
```

4

Enable the Oracle Enterprise Manager App for Grafana

After the App has been installed, you need to enable Grafana to work with your Enterprise Manager site.

1. Enable the Enterprise Manager App on the Grafana site.
 - a. From the Grafana home page, select **Configuration>Plugins**.
A list of available Grafana plugins displays.
 - b. Choose **Oracle Enterprise Manager App** from the list.
The Enterprise Manager App **Enable** and **Disable** options are displayed.
 - c. Click **Enable**.
2. Enable the Grafana Service on your Enterprise Manager site.

```
emctl set property -name oracle.sysman.db.restfulapi.grafana.enable
-value true -sysman_pwd <your sysman pwd>
emctl set property -name
oracle.sysman.db.restfulapi.grafana.executesql.repository.query.enable
-value true -sysman_pwd <your sysman pwd>
emctl set property -name
oracle.sysman.db.restfulapi.grafana.executesql.target.query.enable -
value true -sysman_pwd <your sysman pwd>
```

3. As a best practice, to optimize Enterprise Manager performance, you want to minimize resource demands placed on Enterprise Manager subsystems when Grafana fetches dashboard data.

Grafana communicates directly with the Enterprise Manager OMS to obtain data to render dashboards via REST API calls. In order to protect the performance of key Enterprise Manager subsystems, it has been designed to limit overuse of API end-points that could negatively impact performance. In addition to this protection, additional protection has been added to the Enterprise Manager Repository to prevent long running or resource intensive queries from compromising the operational performance of key Enterprise Manager subsystems.

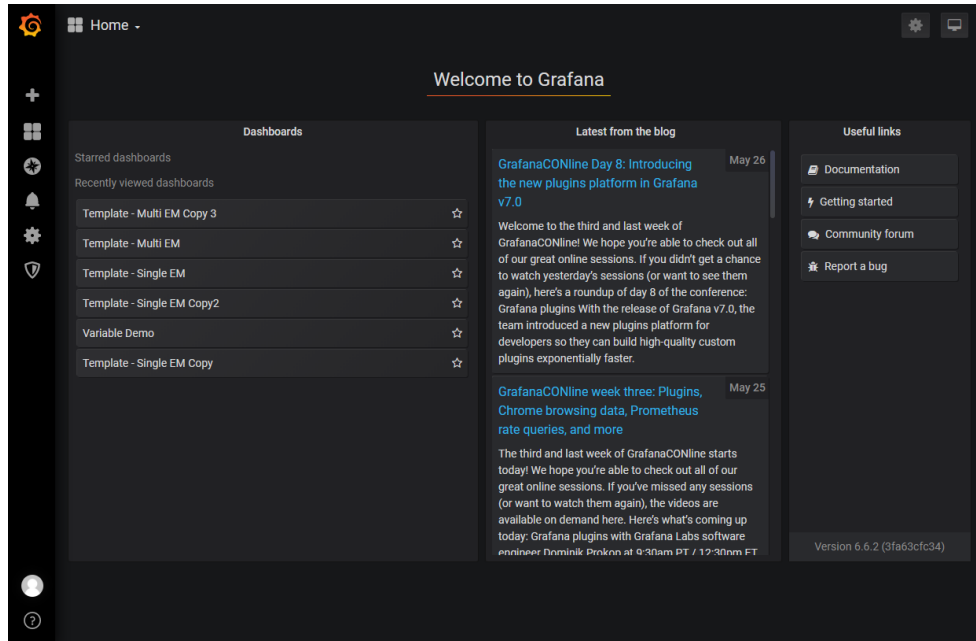
Enterprise Manager provides two ways to manage dashboard resource usage.

- **Repository Session (SQL) Throttling:** You use Database Resource Manager to limit resource usage at the DB or PDB level.
- **Application API Throttling:** You set OMS properties to limit the number of concurrent API requests being executed by the OMS.

 **Note:**

Application API throttling only applies to Grafana dashboard creation.

4. Using your Grafana username and password, log in to the Grafana site using the following URL: `http://<host>:3000 (username/password : admin/admin)`



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Using Grafana

Taking advantage of Grafana's flexible data display capability is easy. You can use dashboards that are included with the Oracle Enterprise Manager App for Grafana or create your own custom dashboards.

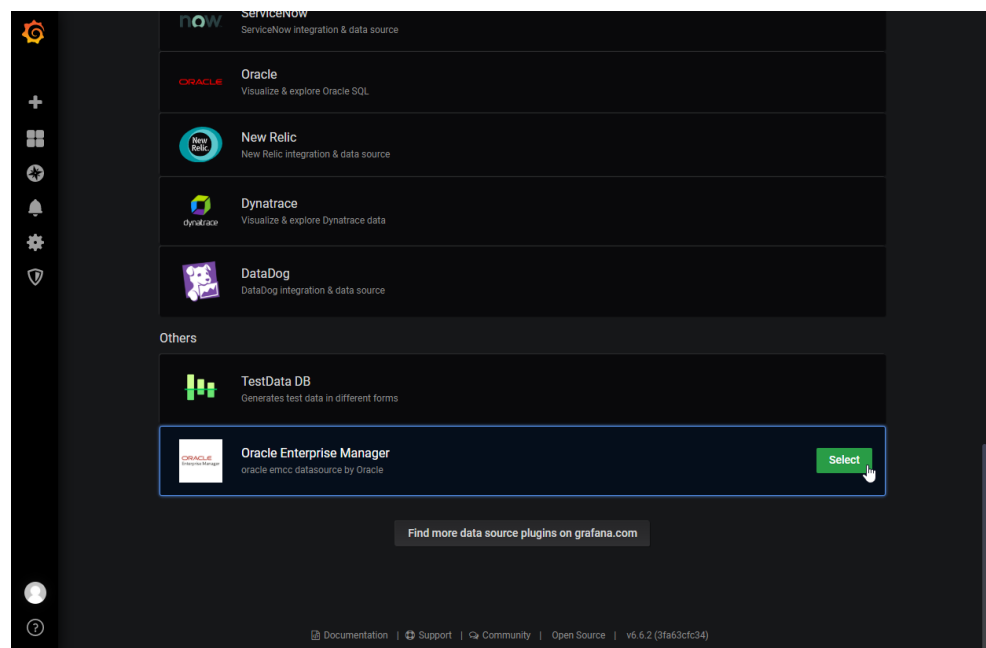
- [Add an Enterprise Manager Data Source](#)
- [View Predefined Dashboards](#)
- [Build Custom Dashboards](#)
- [Sample Dashboards](#)
- [Create Dashboards Using Predefined Templates](#)
- [Access Remote Repositories](#)

Add an Enterprise Manager Data Source

Before you can create a dashboard, you need to specify an Enterprise Manager site from which the dashboard will be pulling data.

To add an Enterprise Manager site as a data source:

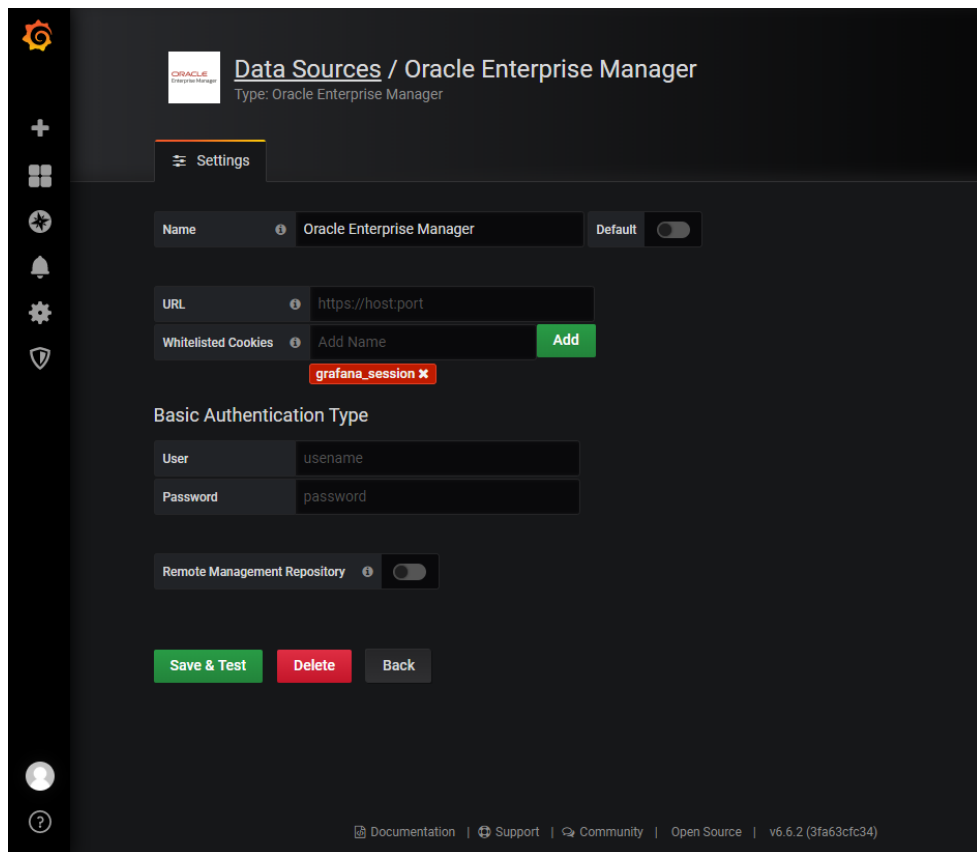
1. From the left tool bar, choose **Configuration > Data Sources**.
2. Click **Add data source**. A list of data source types is displayed.
3. Select **Oracle Enterprise Manager**.



4. Enter the requisite Enterprise Manager login information and click **Save & Test**.

 **Note:**

Do not use SYSMAN or Enterprise Manager users with Super Administrator privileges.



- Name: A descriptive name for your Enterprise Manager site.
- Default: Specifies that the Enterprise Manager site be used as the default data source when creating new dashboards or specifying queries. This option can be toggled on for only one Enterprise Manager site (if you are monitoring multiple sites).
- URL: The URL used to access the Enterprise Manager site. **Important:** Do not insert a slash at the end of the URL.
Example: `http://myem.myhost.com:7788`
- Whitelisted Cookies: The **grafana_session** generates a unique session identifier that is passed to Enterprise Manager. This cookie is added by default and should not be removed. If not present, you **MUST** specify the **grafana_session** when adding the Enterprise Manager data source. An error will occur if this cookie is not specified. The **grafana_session** cookie is used specifically for SQL/Load throttling. See Controlling Resource Usage in the *Enterprise Manager Cloud Control Administrator's Guide*.

- **Basic Authentication:** Enterprise Manager user and password. Users will only be able to query those targets and metrics for which their Enterprise Manager accounts have permission. Specifying an appropriate Enterprise Manager user with the right level of target access privileges ensures adherence to Enterprise Manager security recommendations.
- **Remote Management Repository:** When switched on, this option allows you to connect to Enterprise Manager Repository data sources prior to EM 13.4 and additionally allows you to connect to additional Enterprise Manager Repositories that are not associated with the Enterprise Manager OMS configured for use with Grafana. For more information, see [Access Remote Repositories](#).

 **Note:**

The named credential for the repository database will be saved to the Enterprise Manager 13.4 installation. With this system dependency, the hostname/port/service or SID will be exposed to anyone with access to Grafana UI (Datasource page). It is strongly recommended that users to upgrade to 13.4 RU3 to remove this dependency.

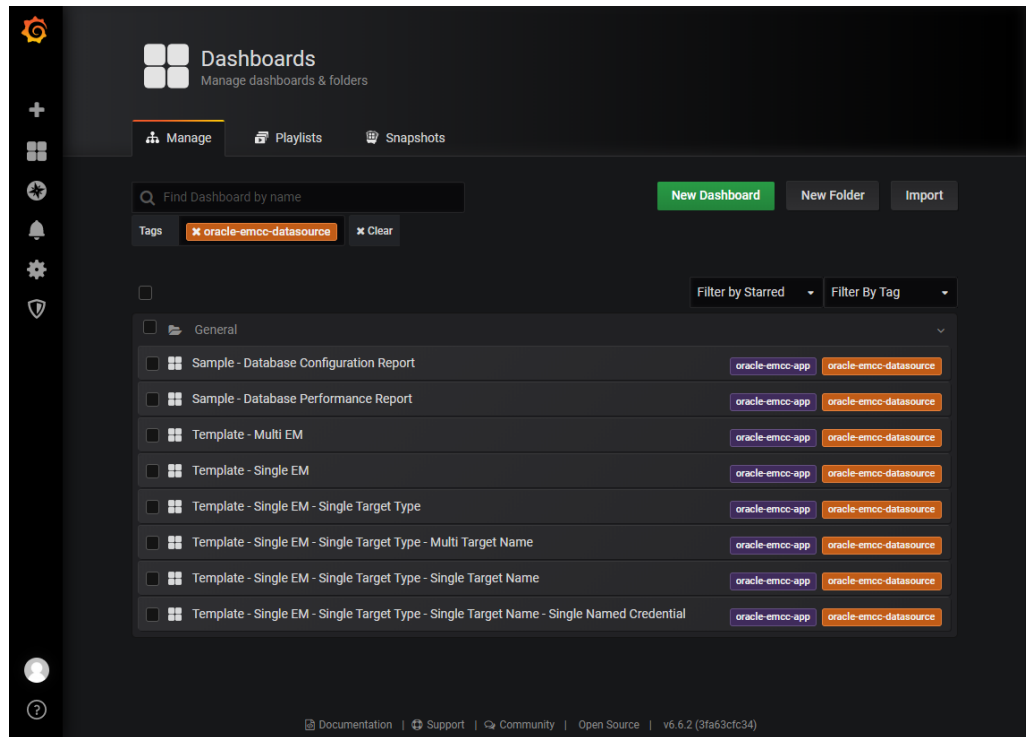
View Predefined Dashboards

The Oracle Enterprise Manager App for Grafana ships with predefined dashboards that let you visualize key operational data about an Enterprise Manager site.

 **Note:**

For a demonstration of how to use out-of-box dashboards, you can view the video [Oracle Enterprise Manager App for Grafana Out-of-the-box Dashboards](#).

From the left tool bar, select **Dashboards > Manage** to view all dashboards installed with the App.



Click on one of the sample dashboards:

- *Sample-Database Configuration Report (Non-Time Series)*
- *Sample-Database Performance Report (Time Series)*

Note:

If you want to make changes to the two sample dashboards, you must first make a local copy of the dashboard using the **Save As** option. Click the (Settings) gear icon in the top toolbar to display dashboard settings and then click **Save As....**

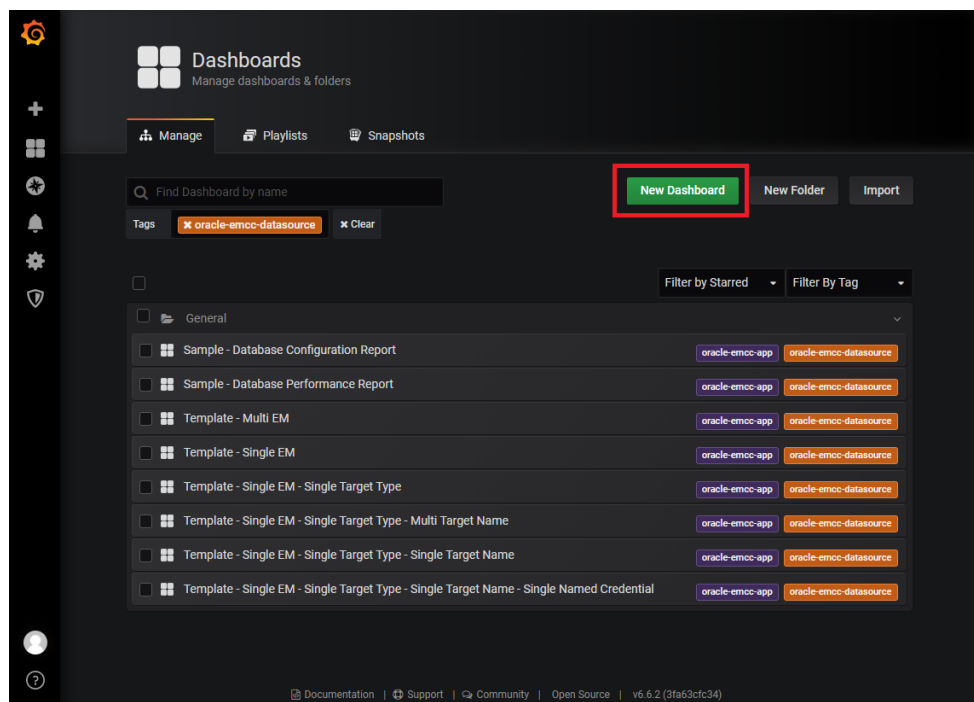
Build Custom Dashboards

You can easily create your own dashboards to meet the unique monitoring needs for your environment.

Note:

Ensure that the Enterprise Manager data source has already been defined before building a custom dashboard.

1. From the left tool bar, select **Manage** from the Dashboards menu.
2. Click **New Dashboard** to begin defining your custom dashboard.



3. If you haven't already, define your data source (Enterprise Manager site you are pulling data from), target types and names. For information on setting up data sources, see [Add an Enterprise Manager Data Source](#).

Use SQL Queries

You can create visualization panels by querying the Enterprise Manager data.

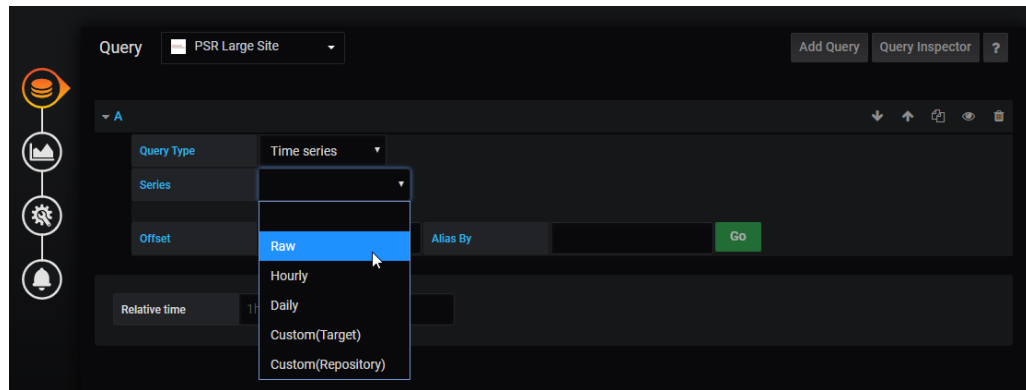
Query Builder

The Oracle Enterprise Manager App for Grafana supports pulling metric data from published Enterprise Manager `MGMT$` repository views, for example `MGMT$METRIC_DETAILS`, utilizing SQL queries.

Note:

`MGMT$_views` are only needed when extracting data from an Oracle Enterprise Manager Repository.

For more information about Enterprise Manager Management Views, see [About Management Repository Views](#).



There are three built-in time series queries.

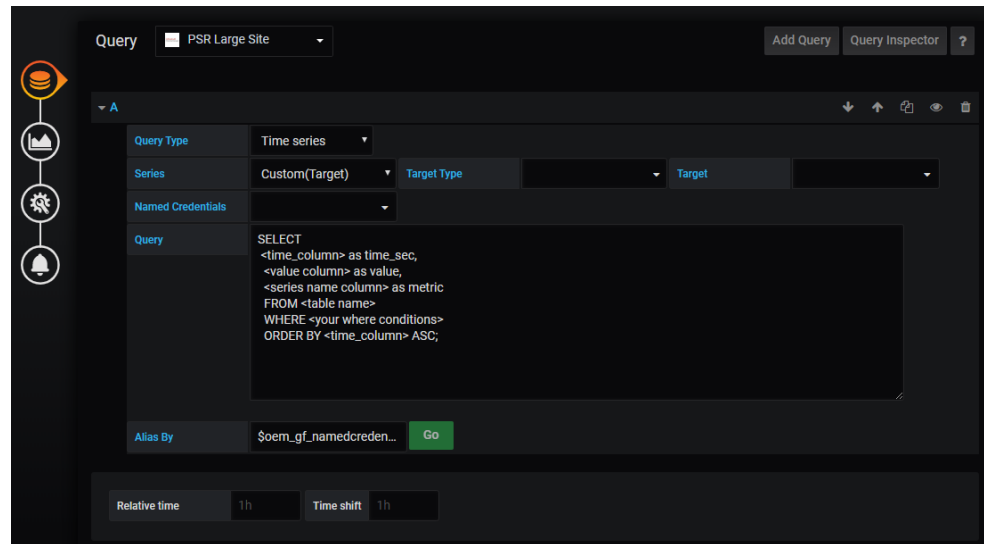
- **Raw:** Option pulls data from `sysman.MGMT$METRIC_DETAIL`. Usage Guideline: Data kept for a month.
- **Hourly:** Option pulls data from `sysman.MGMT$METRIC_DAILY`. Usage Guideline: Data kept for three months.
- **Daily:** Option pulls data from `sysman.MGMT$METRIC_HOURLY`. Usage Guideline: Data kept for six months.
- **Custom (Target)/Custom (Repository)** Option pulls data from any tables based on your own query. You extract data from and Enterprise Manager Repository using repository views.

Note:

When writing your own SQL query, it must have following column aliases:

- *time_sec* - This column must be a date/timestamp data type column.
- *value* - This column must be a number data type column.
- *metric* - This column must be a string data type. It can also be a hard-coded string.

```
SELECT
<time_column> as time_sec,
<value column> as value,
<series name column> as metric
FROM <table name>
WHERE <your where conditions>
ORDER BY <time_column> ASC;
```

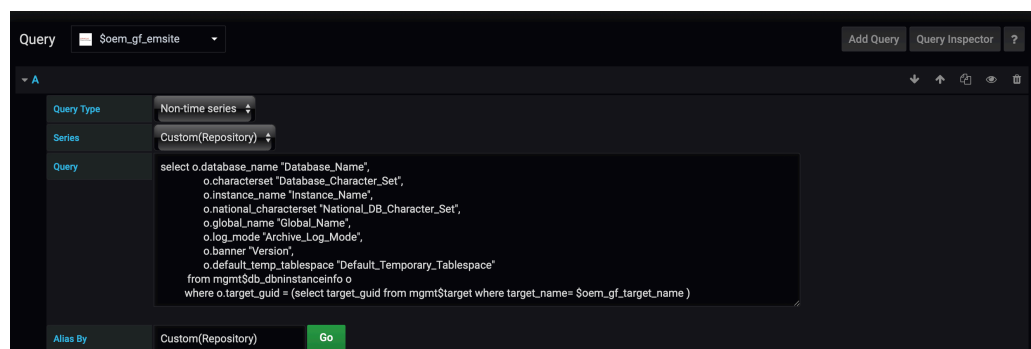


Query Type - "Non-time series" using MGMT\$ Views

Select the **Non-time series** Query Type to query from the Enterprise Manager repository tables:

Note:

The **Non-time series** option is used for table visualization only. It will not work with any other graph-oriented visualization.



Note:

For more information about Enterprise Manager Management Views, see [About Management Repository Views](#).

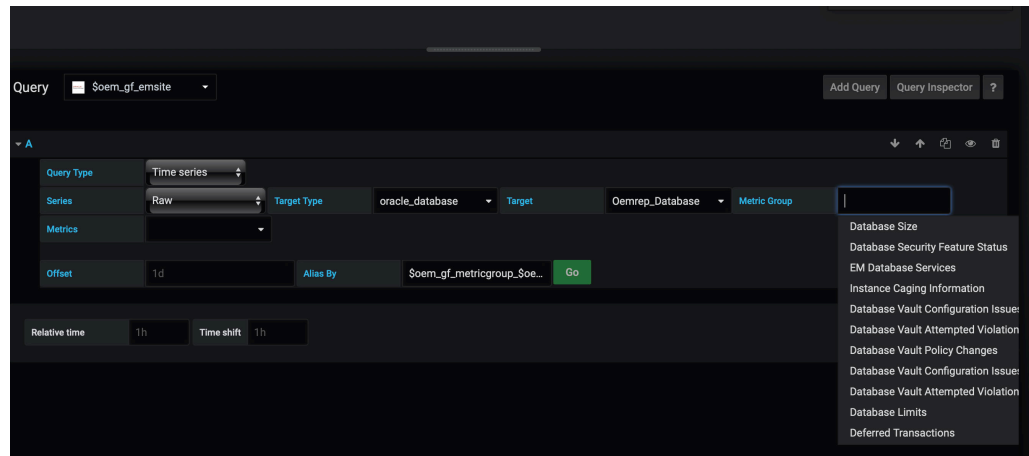
Browse Enterprise Manager Metrics

The Oracle Enterprise Manager App for Grafana also supports browsing various Enterprise Manager metrics and selecting the type, group and names of metrics you want to visualize.

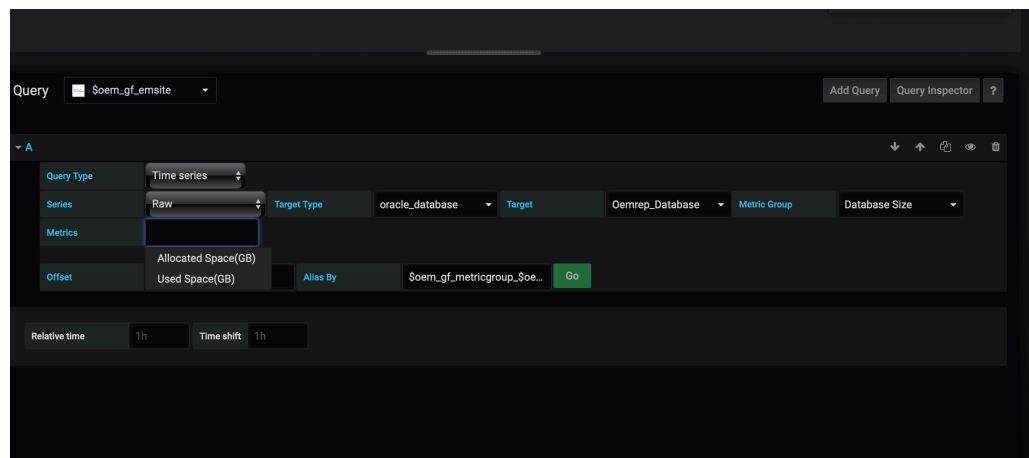
Query Type - "Timeseries"

Select the format, **Raw, Hourly or Daily**, then select **Target Type**, **Target** name, **Metric Group** and **Metric** of interest:

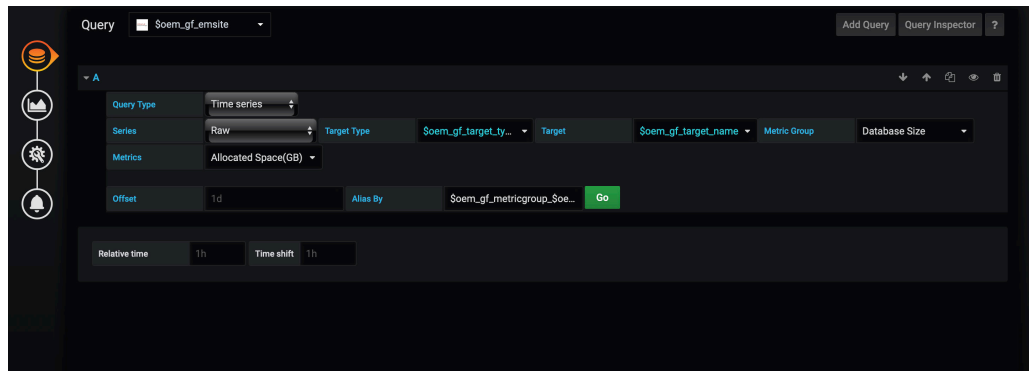
Metric Group



Metric



Using variables for target type and target name.



Note:

Variable names such as *oem_gf_target_type* and *oem_gf_target_name* will be available **ONLY** if you have cloned the dashboard from **Template** dashboards.

Create Federated Data Dashboards

Grafana lets you unify monitoring data from multiple Enterprise Manager sites.

To visualize data across multiple sites:

1. Query data for one Enterprise Manager site and save that visualization.
2. Duplicate that panel, edit its data source to point to a new Enterprise Manager site.
3. Rename it and publish it to the same dashboard.

For example, you can visualize availability data from two separate Enterprise Manager sites in different regions, as shown below.

| Availability Status - North America | | Availability Status - EMEA | |
|-------------------------------------|----------|----------------------------|----------|
| AVAILABILITY_STATUS ▾ | COUNT(*) | AVAILABILITY_STATUS ▾ | COUNT(*) |
| Unreachable | 76 | Unreachable | 4 K |
| Target Up | 218 | Target Up | 21 K |
| Target Down | 95 | Target Down | 2 K |
| Pending/Unknown | 15 | Remote Host Unreachable | 7 |
| Metric Error | 7 | Pending/Unknown | 134 |
| | | Metric Error | 11 K |
| | | Blackout | 3 K |

| Availability Status - Oceania | | Availability Status - South America | |
|-------------------------------|----------|-------------------------------------|----------|
| AVAILABILITY_STATUS ▾ | COUNT(*) | AVAILABILITY_STATUS ▾ | COUNT(*) |
| Target Up | 63 | Target Up | 2 |
| Target Down | 11 | Pending/Unknown | 13 |

To create a custom federated dashboard, you can use the pre-defined **Multi-EM** template.

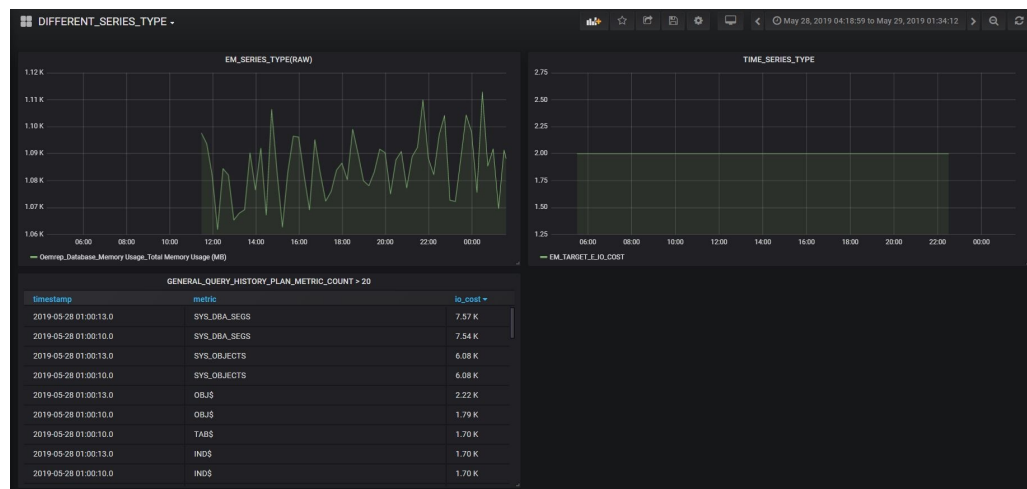
When using the **Multi-EM** template, you'll need to do the following:

1. In the General tab, select the **Repeat** option. This helps when the top-level site selection has multiple sites checked.
2. Select only one Enterprise Manager site from the top-level selection.
3. Set up a non-time series based query against a single repository within an Enterprise Manager instance.
4. Replicate the same setup/query across other instances of Enterprise Manager that are enabled as *Data Sources* by selecting other Enterprise Manager instances from the drop-down.

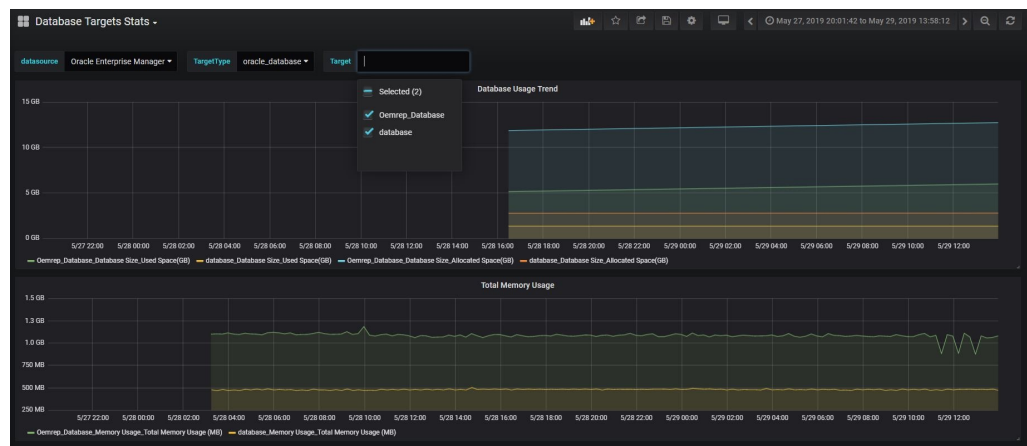
Sample Dashboards

The following dashboards demonstrate the information display flexibility you have using Grafana.

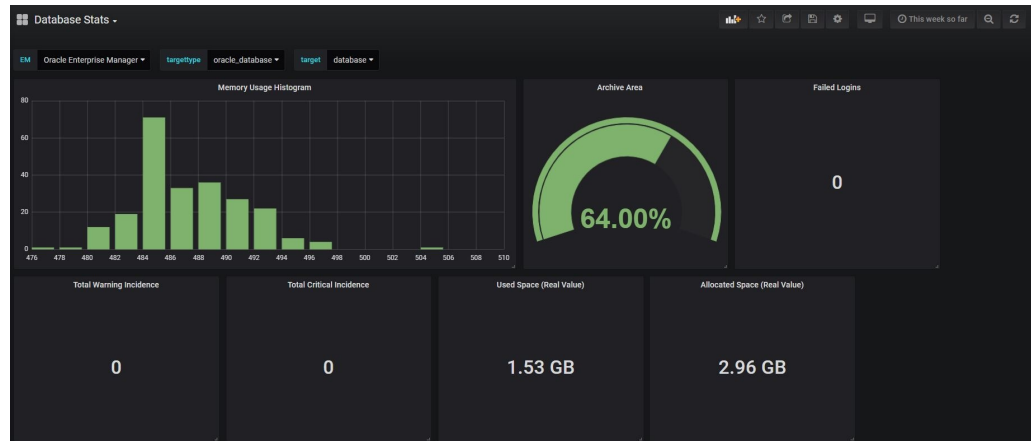
Dashboard with different series types:



Dashboard with single target type and multiple targets (Data from a Single Enterprise Manager site, multiple targets) :



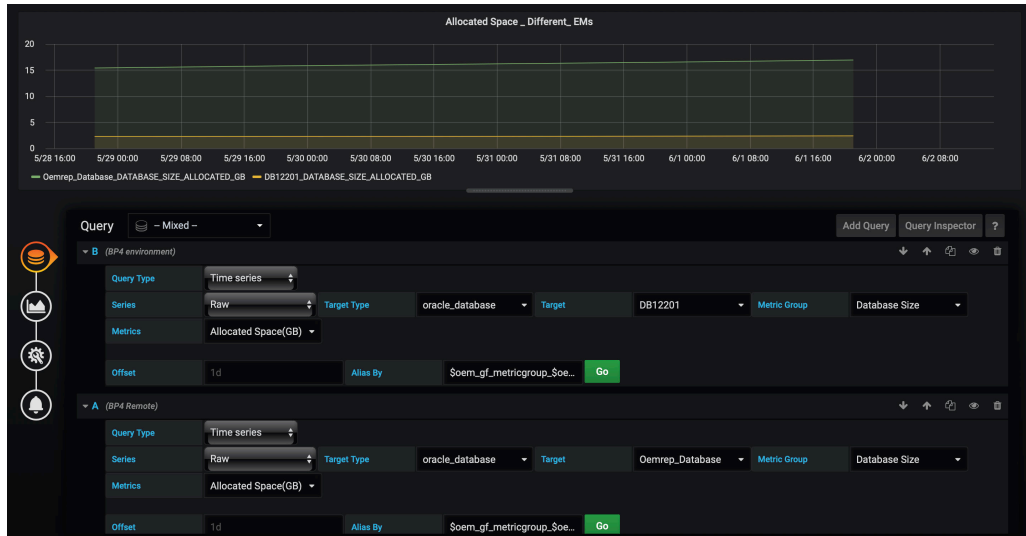
Dashboard with single target type and single target selection(Data from a single Enterprise Manager site, single targets):



Dashboard with separate panels, pulling data from the different Enterprise Manager sites (Data from multiple Enterprise Manager sites, multiple targets) :



Dashboard with a single panel pulling data from a different Enterprise Manager sites (Data from multiple Enterprise Manager sites , single panel):



Database Configuration Dashboard

Sample - Database Configuration Report

EM: Oracle Enterprise Manager | Target Type: oracle_database | Target Name: DB12201

| Instance Information | | | | | | |
|----------------------|-----------------------|---------------|------------------------|------------------|-------------------------|------------------------|
| Database_Name | Database_Character... | Instance_Name | National_DB_Charact... | Archive_Log_Mode | Version | Default_Temporary_T... |
| DB12201 | AL32UTF8 | DB12201 | AL16UTF16 | NOARCHIVELOG | Oracle Database 12c ... | TEMP |

| Status of Database Options | | Non-Default Initialization Parameters | | Controlfile Configuration | |
|----------------------------|------------|---------------------------------------|-----------|---------------------------|------------|
| Option_Name | Configured | Parameter | Value | File_Name | OS_Storage |
| Zone Maps | TRUE | undo_tablespace | UNDOTBS1 | /scratch/.../... | / |
| XStream | TRUE | sga_target | 805306368 | /scratch/.../... | / |
| XDB | TRUE | remote_login_passwordfile | EXCLUSIVE | | |
| Unused Block Compression | TRUE | redo_transport_user | RMAN | | |
| Unified Auditin... | FALSE | ... | ... | | |

| Tablespace Configuration | | | | | | | |
|--------------------------|--------|-----------|-------------------|-----------------|--------------------|-----------|----------------|
| Tablespace_Name | STATUS | Contents | Extent_Management | Allocation_Type | Segment_Space_M... | Logging | Initial_Extent |
| SYSAUX | ONLINE | PERMANENT | LOCAL | SYSTEM | AUTO | LOGGING | 65536 |
| SYSTEM | ONLINE | PERMANENT | LOCAL | SYSTEM | MANUAL | LOGGING | 65536 |
| TEMP | ONLINE | TEMPORARY | LOCAL | UNIFORM | MANUAL | NOLOGGING | 1048576 |

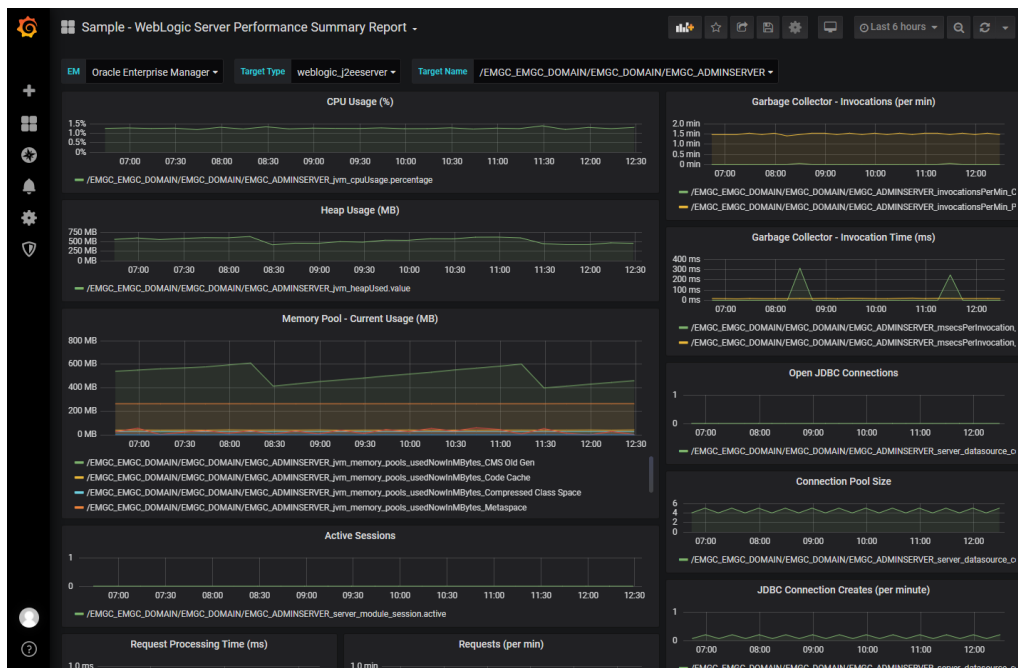
| Datafile Configuration | | | | | | | |
|------------------------|-----------------|--------|----------------|------------|----------------------|-----------|------------|
| File_Name | Tablespace_Name | Status | Autoextensible | SIZE_M_COL | MAX_FILE_SIZE_M_C... | Increment | OS_Storage |
| /scratch/.../122... | SYSAUX | ONLINE | YES | 0 | 34359721984 | 1280 | / |
| /scratch/.../122... | SYSTEM | SYSTEM | YES | 0 | 34359721984 | 1280 | / |
| /scratch/.../122... | TEMP | ONLINE | YES | 0 | 34359721984 | 80 | / |

| Redolog Configuration | | | | Rollback Segment Configuration | | |
|-----------------------|----------|---------|--|--------------------------------|-----------|-----------------|
| Group_Num | Status | Members | File_Name | Log_Size | Roll_Name | Tablespace_Name |
| 1 | Current | 1 | /scratch/.../12201/db/oradata/DB12201/redo01.log | 204,800 | SYSTEM | SYSTEM |
| 2 | Inactive | 1 | /scratch/.../12201/db/oradata/DB12201/redo02.log | 204,800 | | |
| 3 | Inactive | 1 | /scratch/.../12201/db/oradata/DB12201/redo03.log | 204,800 | | |

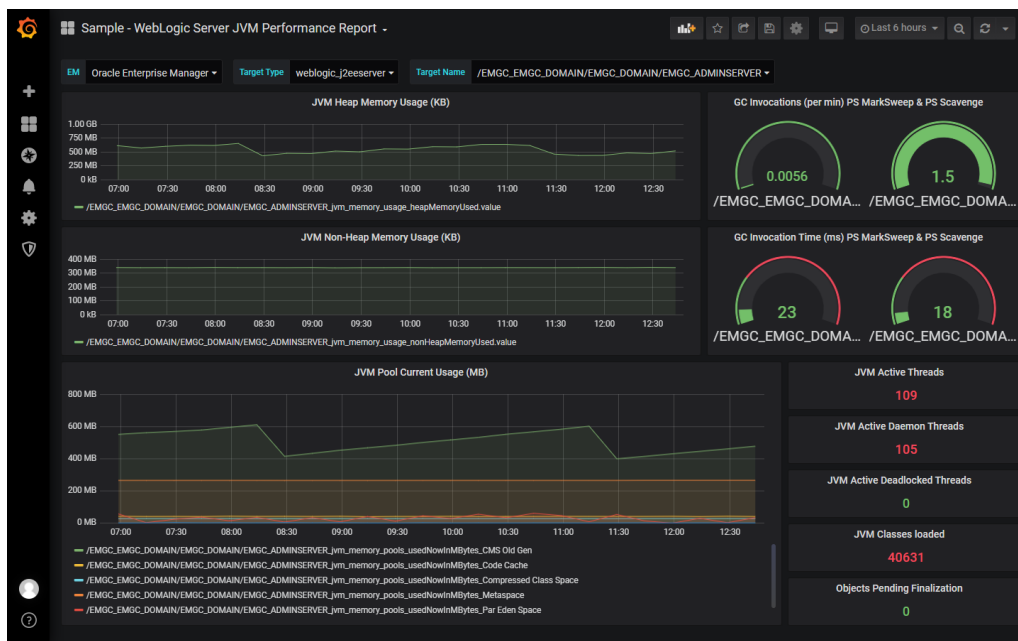
Database Performance Dashboard



WebLogic Server Performance Summary Dashboard



WebLogic Server JVM Performance Dashboard

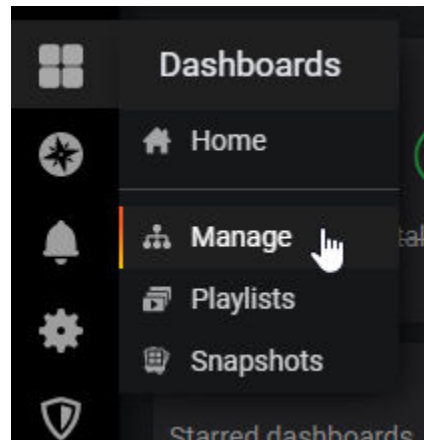


Create Dashboards Using Predefined Templates

The Oracle Enterprise Manager App for Grafana comes with a set of predefined dashboard templates that you can use to create new Grafana dashboards without having to develop them from scratch.

To display the available templates and sample dashboards:

1. Select **Manage** from the Dashboards menu.



All available dashboard samples and templates are displayed.

2. Click on the desired template to begin using that template.

IMPORTANT: Before making any changes to a template dashboard, click **Save As** to clone it, otherwise your changes will be lost.

Usage Tips

Template Variables

Dashboards inherit specific Enterprise Manager information via a set of variables shown in the following table.

Table 5-1 Grafana-Enterprise Manager Variables

| Variable | Definition |
|---------------------------|--|
| \$oem_gf_emsite | Enterprise Manager Site |
| \$oem_gf_target_type | Target Type |
| \$oem_gf_target_name | Target Name |
| \$oem_gf_metricgroup | Metric Group |
| \$oem_gf_metric | Metric defined in the above metric group |
| \$oem_gf_named_credential | Named Credential of a target |

When you clone a template dashboard, your dashboard will automatically inherit one or more of below template variables based on the template dashboard you have cloned it

from: \$oem_gf_target_type, \$oem_gf_target_name, \$oem_gf_emsite, \$oem_gf_named_credential.

There are query builder level variables tagged to the drop-down respectively. \$oem_gf_target_type, \$oem_gf_target_name, \$oem_gf_metricgroup, \$oem_gf_metric, \$oem_gf_named_credential which can be used in case the template variables at the dashboard level are not created.

The following example demonstrates how to reference the Template Variables in a SQL query.

```
select <col1>, <col2>
from <table>
where target_type = $oem_gf_target_type
and target_name in ( $oem_gf_target_name )
```

Variable Scope

Variable scope determines the precedence with which the variable is used.

The precedence rules are:

1. Dashboard level scope always has the priority over the query builder level scope.
2. If no template variable of `$oem_gf_target_type`, `$oem_gf_target_name` is not available in the dashboard level, the value will be replaced with the query level scope values.
3. If a template variable is absent in the query builder scope. It will be replaced with an empty string.
4. The scope of query builder level variables is at the **Queries** tab only.

Access Remote Repositories

The Oracle Enterprise Manager App for Grafana is only available with Enterprise Manager Release 13.4 Release Update 3 and above. If, in addition to your Enterprise Manager 13.4 installation, you are also maintaining older versions of Enterprise Manager in your environment, you can still use Grafana to create dashboards for these older Enterprise Manager Repositories. Be sure to check the [Oracle Enterprise Manager App for Grafana download page](#) for the versions of repositories supported.

When creating an Enterprise Manager data source in Grafana, you have the option of accessing a Remote Management Repository.

Data Sources / Oracle Enterprise Manager
Type: Oracle Enterprise Manager

Settings

Name: Oracle Enterprise Manager Default:

URL: https://mysite.com:11040

Whitelisted Cookies: Add Name Add

grafana_session ✕

Basic Authentication Type

User: scott

Password:

Remote Management Repository

Host:Port: omr.mysite.com:2312

Service Name: orcl281216.omr.mysite.com

Named Credential:

Save & Test Delete Back

By defining a Remote Management Repository data source, you can have Grafana point to multiple non-13.4 repositories in your environment, thus providing you with the ability to visualize data from all Enterprise Manager installations in your managed environment.

When the Remote Management Repository is switched on, you need to specify the following information:

- **Host** and **Port** where the remote repository resides.
- **SID** or **Service Name** of the repository.
- **Named Credential**: The Global Named Credential used to log in to the remote repository.
The Global Named Credential must already be defined in Enterprise Manager. These Global Named Credential must be defined in Enterprise Manager Release

13.4, Release Update 3 and above only. For more information about Global Named Credentials, see Named Credentials in the *Enterprise Manager Cloud Control Security Guide*.

6

Update the Oracle Enterprise Manager App for Grafana

You can update the App with the latest release by downloading the most recent distribution file and overwriting the existing content in your Grafana Server home directory.

The Oracle Enterprise Manager App for Grafana upgrade can be performed using either of the following methods:

- Upgrade using the Grafana command line interface (Recommended)
- Upgrade manually

To perform the update using the Grafana command line interface:

1. Remove the existing App.

```
./grafana-cli --pluginsDir <PLUGIN_DIR> plugins remove oracle-emcc-app
```

2. Install the new App.

```
/grafana-cli --pluginsDir <PLUGIN_DIR> --pluginUrl <FULL_PATH>/oracle-emcc-app-<VERSION>.zip plugins install oracle-emcc-app
```

Alternatively, instead of specifying the full path to the App distribution file, you can specify a download URL.

```
./grafana-cli --pluginsDir <PLUGIN_DIR> --pluginUrl <PLUGIN_URL> plugins install oracle-emcc-app
```

3. Restart the Grafana Server.

```
cd $GRAFANA_HOME/bin  
./grafana-server
```

To perform the update manually:

1. Download Oracle Enterprise Manager App for Grafana zip file *em-datasource-<version>.zip* from the [Oracle Enterprise Manager App for Grafana download page](#).
2. Extract the App files.

```
unzip em-datasource-<version>.zip
```

3. Move the existing App files from your Grafana home directory to a backup directory.

```
mv $GRAFANA_HOME/data/plugins/oracle-emcc-app/* <backup directory>
```

 **Note:**

As a best practice, you should always make a complete backup of this directory before updating directory content.

4. Copy the latest App files to your Grafana home directory.

```
cp -r oracle-emcc-app-<version>/* $GRAFANA_HOME/data/plugins/oracle-emcc-app
```

5. Restart the Grafana Server.

```
cd $GRAFANA_HOME/bin  
./grafana-server
```