PURE STORAGE FLASHSTACHE ADMINISTRATION GUIDE

VERSION 1.0

October 18, 2017

INTRODUCTION

FlashStache is a new open source software stack that works with Pure Storage's FlashArray REST API, a MySQL database, and two other open-source packages and to provide a graphic user interface (GUI) for viewing operations in FlashArrays through read-only graphs.

FlashStache creates a database from which to report the activity of FlashArray systems, including activity with hosts. It can be installed as a Purity App on any system connected to an array and running Ubuntu 16.04. (See Requirements in the next section). Installation requires only a few steps.

While preconfigured views are included to monitor operations into FlashArrays, you can create custom views as well. You can also create custom alerts and notifications to bring attention to critical events.

Along with leveraging the FlashArray REST API, and a MySQL server, FlashStache deploys two open-source products: Django, a web framework product created from Django Software Foundation, Grafana, a data visualization suite from Grafana Labs, Inc. FlashStache brings these packages together to deliver customizable dashboard views of FlashArray performance, IO traffic, space and a number of other important operational factors. The FlashStache software and its functions look something like this:

- FlashArray REST API
- Django and NginX provides management interface
- Grafana provides visualization and alerts
- MySQL stores historical metrics

Once you have logged in and have selected a FlashArray, the Grafana software interface displays the dashboard and lists default dashboard views. Grafana has its own robust documentation to describe its use in detail, including descriptions of how to create new dashboards, views and alerts. You can find this information along with tutorials at http://docs.grafana.org.

In addition, you can also rely on Pure Storage Community website to participate with other Pure Storage users in asking questions, finding answers, and contributing to helpful information such as troubleshooting tips and feedback. Find the community at community.purestorage.com.

This manual provides brief descriptions of the basic operations and the default dashboard views provided by Pure Storage, as well as some brief descriptions of basic Grafana menu options that are immediately relevant.

INSTALLING FLASHSTACHE

Requirements:

- Ubuntu 16.04 (Other operating systems may be added upon request).
- 4 CPU cores, 2+ GB RAM, 2 GB Physical Space per FlashArray

Installation:

1. Enter the following into the address bar of your browser: **code.purestorage.com**. Selection cards display.
2. Click on the card **Flashstache**. The site github.com/PureStorage-OpenConnect opens.
3. Download the **FlashStache** package to the Ubuntu virtual machine (VM) on your device.
4. From the directory where the program was downloaded, run the start.sh script in the flash_stache directory.
5. Ensure that TCP Port 3000 is open and accessible (for the Grafana program).
6. You can then one or more add FlashArrays. (See Basic Processes, on the next page for instructions).

Troubleshooting:

If an issue is encountered during installation, try one or all of these steps:

- See the array's install.log and look for errors that may point to an issue you can resolve.
- Click **Logs** in the upper right-hand corner of the opening screen and look for errors that may point to an issue you can resolve.
- Go to the PureStorage community at community.purestorage.com to look for answers.
- Verify that required services are running by following these steps:

  1. Run: ps auwx | grep python
  2. You should see these running:

     ```
     manage.py runserver
     manage.py rqworker
     manage.py rqscheduler
     ```

  3. If they are not running, then start them from the flash_stache directory with the following command:

     ```
     ./start.sh
     ```

- Navigate to the FlashArray's landing page in your web browser and click **Edit**. Follow these steps:
    1. Uncheck **Enabled** and click **Update**.
    2. Re-check **Enabled** and click **Update** again.
    3. Navigate to the landing page in your FlashArray's web browser.
    4. Evaluate whether the problem was resolved by checking for running tasks for this array in the logs tab.

BASIC PROCESSES

Once you log into FlashStache, it displays the Opening Screen where you can add one or more FlashArrays. After each is added, the screen displays them in a list with a number of options.

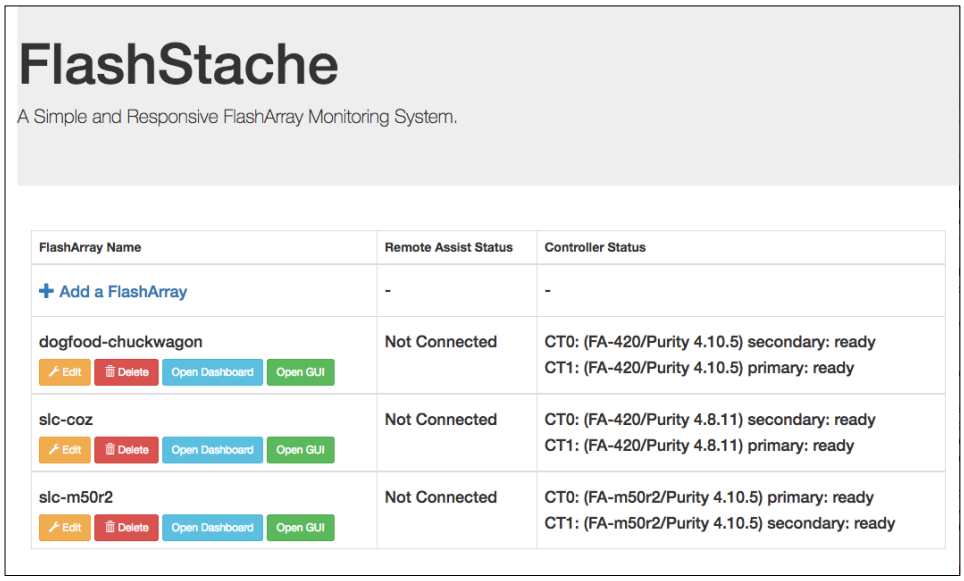


Figure 1: FlashStache Landing Page

From this screen, you can choose one or more of the following:

Add a FlashArray

When you add a FlashArray, it creates a dashboard and configures data-collection jobs that save data to the database make it accessible for dashboard views. To add FlashArray for viewing, do the following:

1. Click **+Add a FlashArray**.
2. In the correct fields, enter the following information:
   - Hostname
   - IP address
   - API token (For more information, see Appendix 1).

Edit

To edit the settings for the Interval, Database Retention, or which dashboards are actively used, do the following:

1. Click **Edit**.
   - Click the **Interval** menu to select the amount of time to lapse before data is refreshed.
   - Click the **Database Retention** menu to select the amount of time that the data is retained for analysis in the FlashStache database.

- Check or uncheck the **Enabled** box to deactivate the API data gathering tasks without deleting it, (or reactivate the dashboard after it's deactivated). Click **Update** to save your changes.

Delete an Array

To delete a FlashArray from the Interface do the following. (Deletes the FlashArray's listing, its data, and its associated data collection job).

1. Click **Delete**. A verification dialog displays.
2. Confirm the choice.

Open the Dashboard

1. Click **Open Dashboard**. (See *Working with Dashboard Views*, on the next page).

Open GUI

Open the graphic user interface (GUI) for that individual FlashArray.

1. Click **Open GUI.** The FlashArray's GUI displays.

WORKING WITH DASHBOARD VIEWS

Alert and Default Dashboard Views

When you click on **Open Dashboard**, rows of choices are listed. The top row provides a repository for custom alerts after you create them. Each of the other rows displayed designate a default dashboard view, including its graph, legend and menu. To open a row, click on it.

A number of default dashboard views are installed with FlashStache. They are described below. At installation, however, no preconfigured alerts come included. Their development is described below in *Creating and Editing Alerts.*

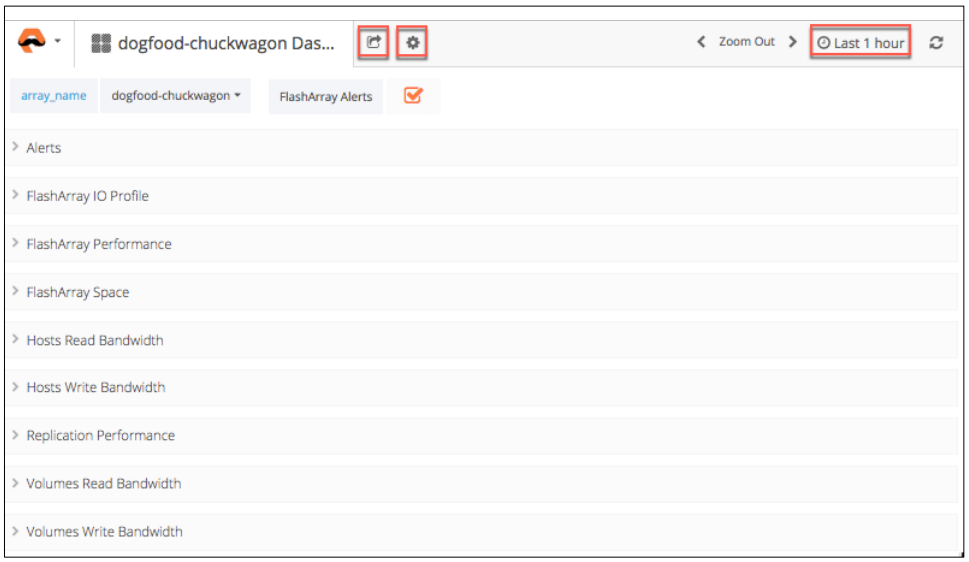
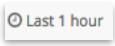


Figure 2: Rows of Alert and Default Dashboard Views

Header Menus and Controls

Above the rows of dashboards, regardless of what row is open, at the top of the screen are a number of controls, including the following:

	Share icon	Click to open Share dialog to open the Share screen. Choose between a number of methods to include others.
	Settings icon	Click to open Settings menu. Especially of note is **Save As**, which lets you save a dashboard before modifying a dashboard view or creating an alert (a required step).
	Time Picker	Click to select as time range for your analysis.

Navigating Dashboard-View Graphs

When you click on one of the rows for dashboard's views, a graph displays with a legend on the far right, showing individual metrics for the current moment. (See Figure 3).

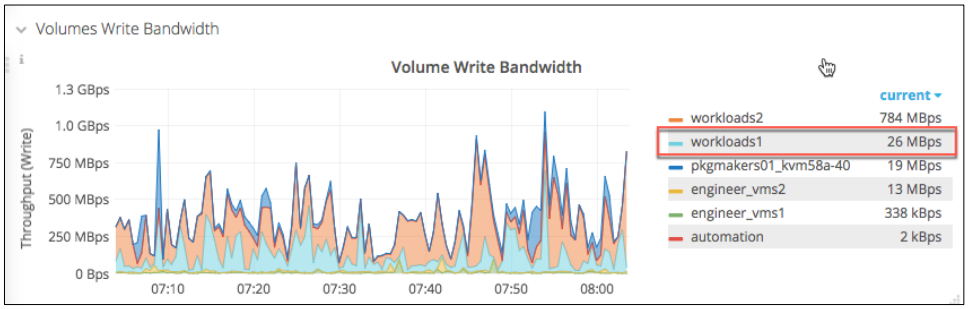


Figure 3: One of Default Dashboard Views with Legend

The Graph and Legend

When a graph's displays, you can do a number of things to see more detailed information:

1. Click on individual legend rows. The graph becomes limited to showing only the factor that is represented by the row.
    a. Hold down the Shift Key and click on another factor to see the graph with that factor added to the single factor. Continue to add factors to make a graph with any combination of factors.
    b. Double click on any row to restore all of the factors in the graph.
2. Hover your cursor above the graph. (See Figure 4). A moving legend displays with your cursor describing the moment in time at which your cursor indicates. The factors identified in the legend are identical to the legend on the far right, so it can show comparisons to the current moment.

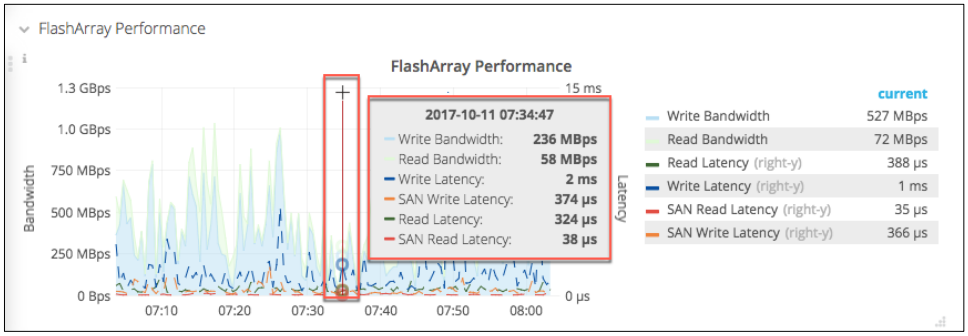


Figure 4: Hover Cursor above Graph for Legend at Moment

Graph Main Menu

In addition to getting more information from the graphs directly, use the Graph Menu for more elaborate actions to take on the data and graphs, or to create alerts. To open the Graph Main Menu, click on the title of the dashboard view. For example, click on the title ***FlashArray Performance*** in the graph depicted in Figure 2. The menu displays.

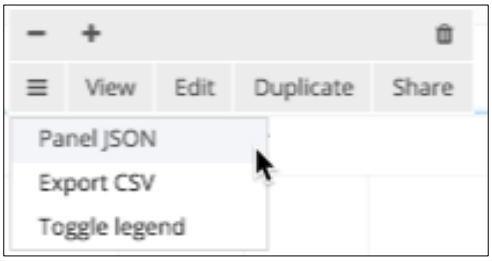


Figure 5: Graph Main Menu

Once you click the dashboard view's title, a menu displays. The Menu icon displays another menu that includes these choices:

Panel JSON

Select this to open the Panel JSON for that panel view. It opens at the top of the screen, above the list of all views. Make any customization you want. Click **Update** when finished.

Export CSV

This selection exports CSV data to a file. Choose to export as a series of rows or columns, the time format, and whether you want to export it as a Microsoft Excel file.

Toggle legend

To turn the graph's legend on or off, use this menu selection.

View

Click **View** to reformat the graph in order that it displays in a larger scale where detail is more clear.

Edit

Clicking **Edit** displays menu choices with which you can change all of the factors in any of the dashboard-view graphs. Additionally, this is where you create alerts to notify yourself and others of significant events that may occur on the FlashArray. (See *Creating and Editing Alerts*).

Briefly, here are each of the Edit menu choices:

General

The General tab displays a dialog in which you name a dashboard view, design its appearance and add Drilldown and detail links.

Metrics

The Metrics tab allows you to identify and work with MySQL code in each dashboard view. For example, if you want to display all hosts in Host Write Bandwidth dashboard view, whether the host is active or not, you can change that factor in the code.

Axes

The Metrics tab allows you to change the scale and appearance of the graph of the dashboard view.

Legend

The Legend tab allows you to change the scale, appearance, and position of the graphic legend in the dashboard view.

Display

The Display tab allows you to change a number of factors in how the graph is physically displayed in the dashboard view, including Draw Modes, (such as Bars, Lines, or Points), Mode Options, (such as Fill, Line Width, or Staircase), and the display of the hover tool tip.

Alert

The Alert tab is where you are able to create alerts, defining the condition and the timing of events that you want to be notified of. See *Creating and Editing Alerts*, below for more detail.

Time Range

The Time Range tab allows you to override the relative time range for individual panels, causing them to be different than what is selected in the Dashboard time picker in the upper right. This allows you to show metrics from different time periods or days at the same time.

Duplicate

Click **Duplicate** to create an identical copy of the current graph. The graph displays next to the current graph, sharing the horizontal space. Use this feature for comparisons of different factors or designs by editing various factors that belong to one of the graphs.

Share

Select this to share the dashboard view as a link, to embed the link in another website or to share a snapshot. If you share as a Snapshot, the program strips sensitive data like queries (metrics, template and annotation) and panel links, leaving only the visible metric data and series names embedded into your dashboard view. (Keep in mind, your snapshot can be viewed by anyone that has the link and can reach the URL).

DEFAULT DASHBOARD-VIEW GRAPHS

The following default dashboard views are currently included with installation:

FlashArray IO Profile

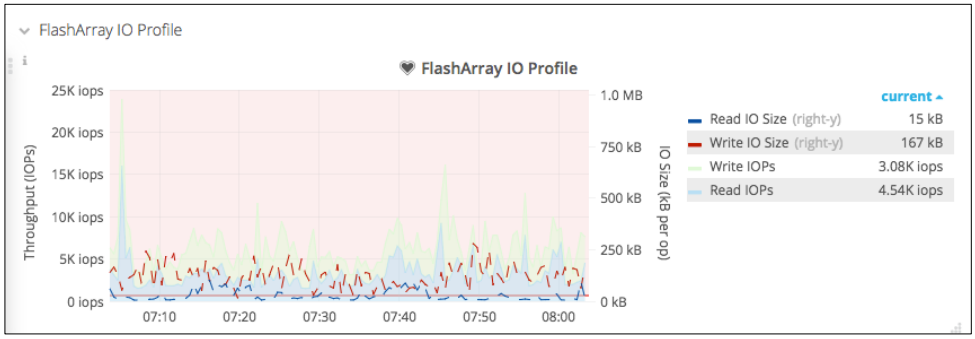


Figure 6: FlashArray IO Profile Dashboard View

- Read IO Size
- Write IO Size
- Write IOPs
- Read IOPs

FlashArray Performance

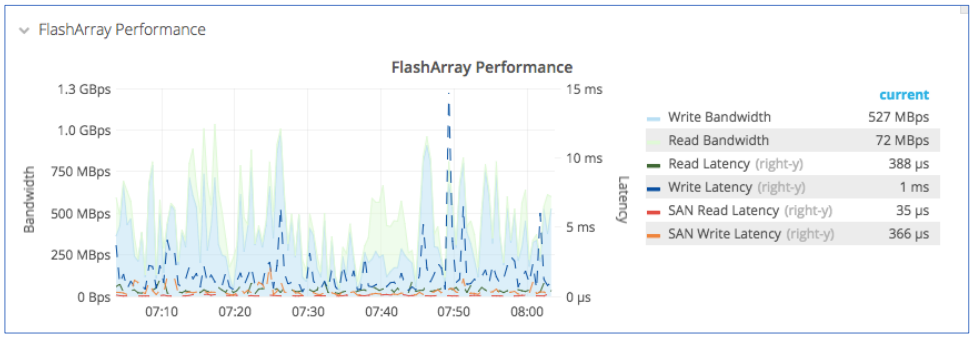


Figure 7: FlashArray Performance Dashboard View

- Write Bandwidth
- Read Bandwidth
- Read Latency (right-y)
- Write Latency (right-y)
- San Read Latency (right-y)
- San Write Latency (right-y)

FlashArray Space

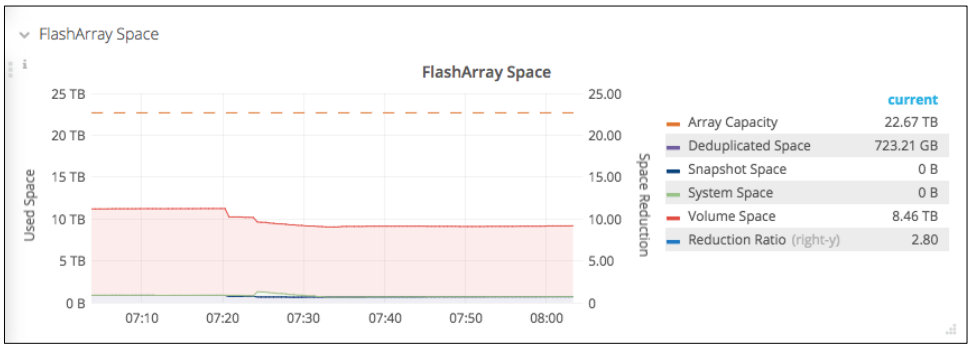


Figure 8: FlashArray Space Dashboard View

- Array Capacity
- Deduplicated Space
- Snapshot Space
- System Space
- Volume Space
- Reduction Ratio

Hosts Read Bandwidth

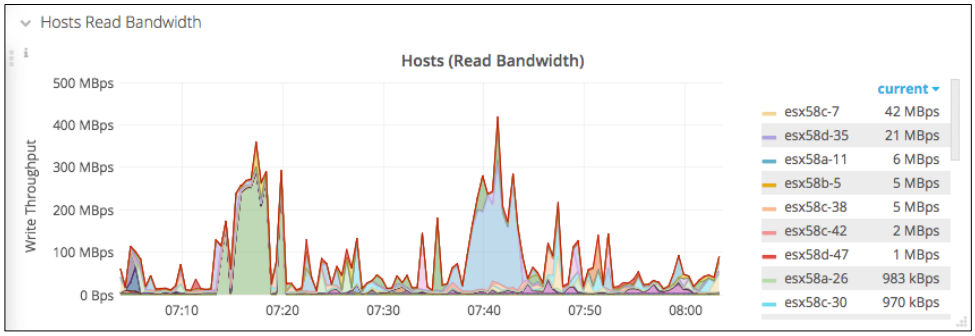


Figure 9: Read Bandwidth Dashboard View

Displays graphs for each of the hosts that are attached to the array and that are active.

Hosts Write Bandwidth

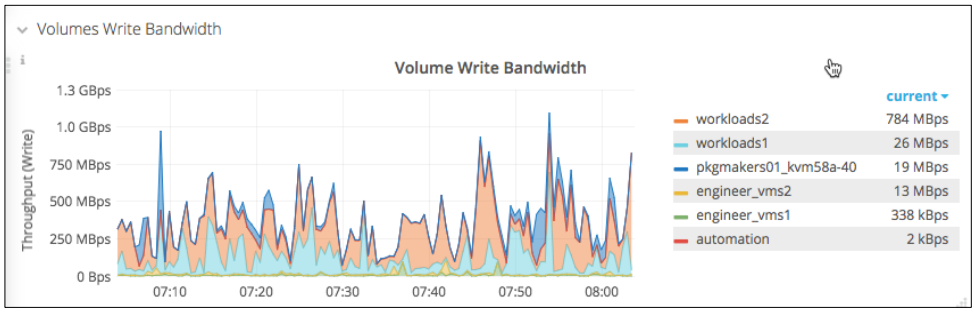


Figure 10: Volume Write Bandwidth Dashboard View

Displays graphs for each of the hosts that are attached to the array and that are active.

Volumes Read Bandwidth

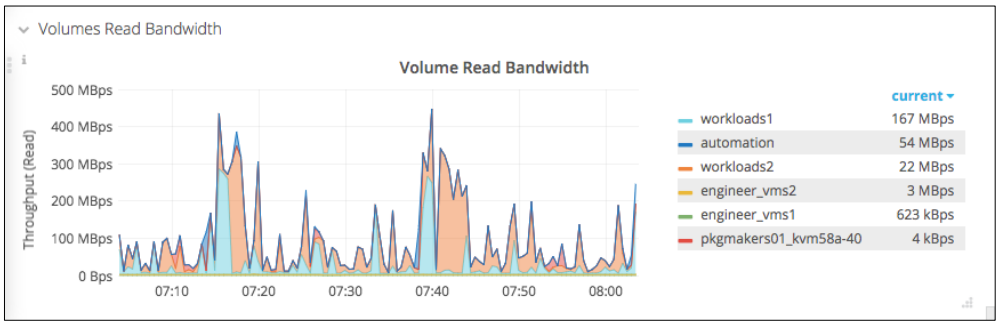


Figure 11: Volume Read Bandwidth Dashboard View

Displays graphs for each of the volumes that are attached to the array and that are active.

Volumes Write Bandwidth

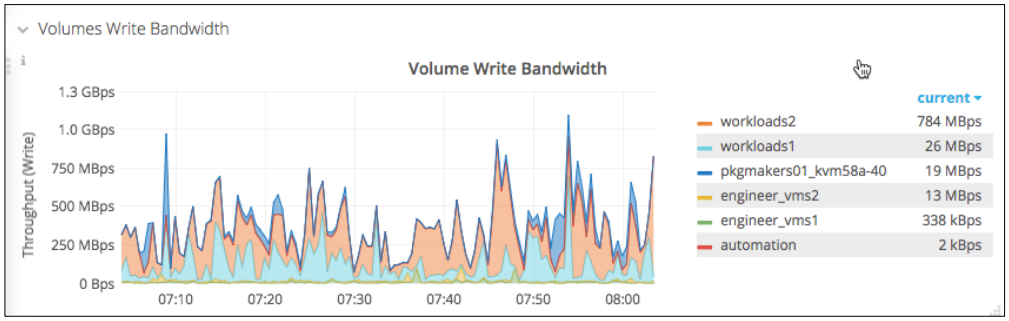


Figure 12: Volume Write Bandwidth Dashboard View

List of each of the volumes that are attached to the array and that are active.

CREATING AND EDITING ALERTS

Creating an Alert

You can create alerts to notify you when a significant event happens. First, complete two preliminary steps: Save the dashboard and then create a notifications channel.

Note: For complete information on creating alerts can be found at docs.grafana.org.

Preliminary to Creating an Alert

1. The dashboard must be saved before any alert can successfully be produced. To do so, click the **Gear** icon in the webpage header. In the dialog that displays, enter a new name for the dashboard and click **Save**.
2. The alerts you create need a notification channel to notify you at appropriate times. Click on the **FlashStache** icon in the upper left corner to open the main Grafana menu. Click **Alerting** and then select **Notification Channels**. The notification Channels dialog opens.
3. In the Name field, enter a name for the notification channel. For example, enter “FlashArray Alerts.”
4. Next to Type, click on the field to the right to open the menu for a type of notification. The default is **Email**. Depending on your choice, a dialog displays below. For example, if you select Email, a field for entering email addresses displays. Or, if you select SLACK, then fields for URL, Recipient, and Mention display.

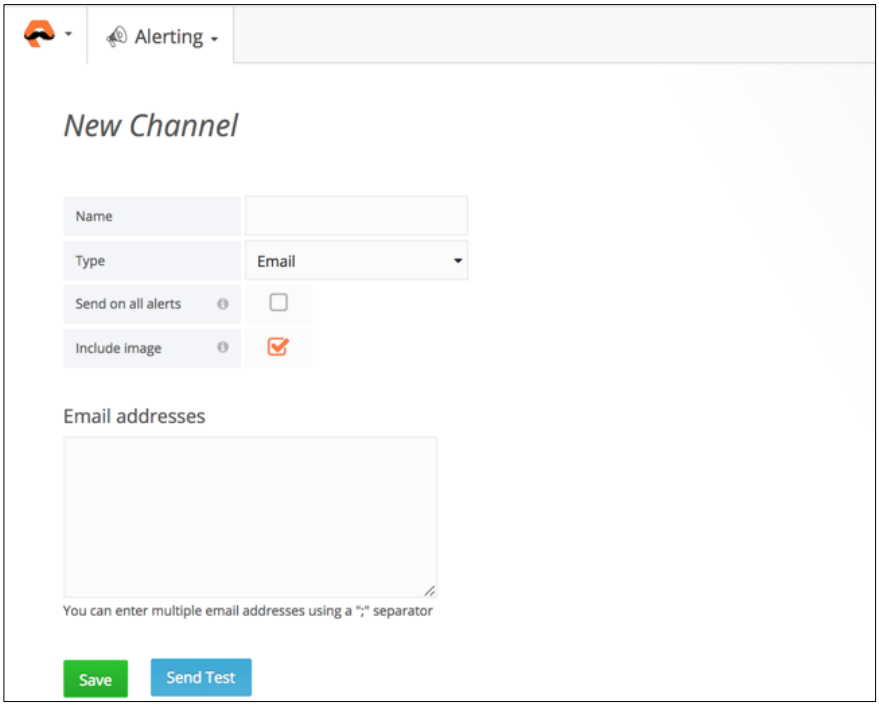


Figure 13: Alerting Notifications New Channel Configuration Dialog

1. Check the box if you want the notification used for all alert rules, existing and new.
2. Check the box to include an image of the graph with the alert when the notification is covered.
3. Enter details in the field that corresponds to the type of notification you chose. For example, if you selected Email, enter email addresses in the field provided.

Creating an Alert

1. Open the dashboard view on which you want to create an alert. For example, click on **FlashArray Performance**.
2. Click the title in the top center of the graph to open the Graph Menu. For example, click the title **FlashArray Performance**.
3. Click **Edit**. The Edit menu opens. It should open to Alert Config. If not, click **Alert Config** on the left side of the screen, above Notifications.
4. Click the **Metrics** tab.
5. Click to open the **Data Source** menu and select **mysql-default**. The MySQL queries for the dashboard view displays. The queries are listed next to letters of the alphabet (A, B, C, etc.).
6. Within the query, take note of the code on which you want to create an alert and record the letter, (A, B, C, etc.). For example, if you want to create an alert in the dashboard view

FlashArray Space for "System Space," make a note of the letter "D." (See Figure 13). You enter this number in Step 12, below.

Figure 14: Choose MySQL Code for Alert

7. Click the **Alert** tab. The Alert dialog displays.
8. Click **Create Alert**.
9. Change the default name of the alert. For example, change "FlashArray Performance alert" to "FlashArray System Space Alert."
10. Under **Alert Config**, enter the number of seconds, (s); minutes, (m); or hours, (h), that represent the intervals of how often you want the alert to check if the condition is met. The default is 60s, (60 seconds).

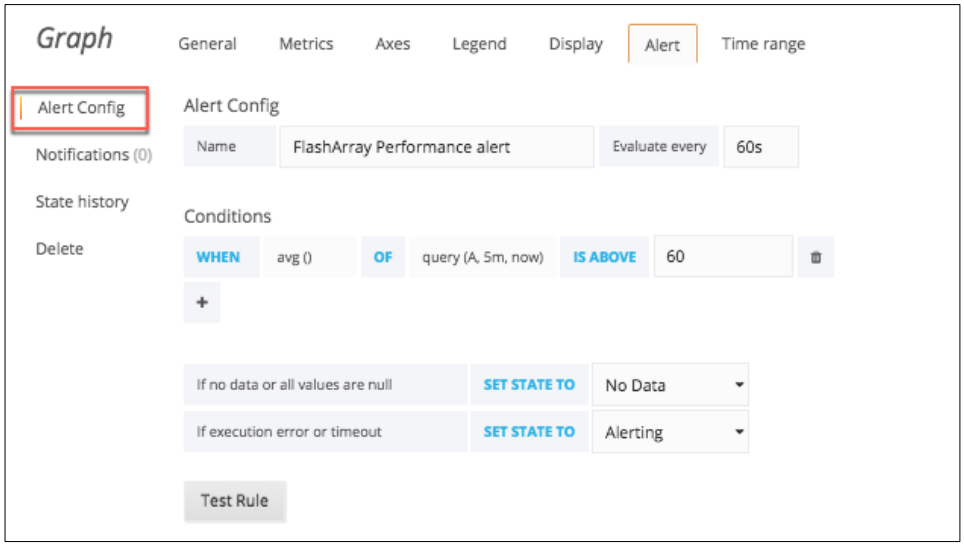


Figure 15: Creating Alert on Alert Tab

11. Under Conditions, click on the **WHEN** field to display the menu. Select min, max, sum, count, last, or median, depending on the alert you want to create. For example, if you want to create an alert based on the amount of System Space in the FlashArray, you may want to be alerted when the average reaches to a certain level. In that case, you may want to select **median**.
12. Click on the **OF** field on top of the word **query** to display the menu. Enter the letter of the alphabet that you identified in Step 6. For example, select **D** to represent that query.
13. Click on the **OF** field on top of the number **5m** to display the menu. Enter a number or select one from the menu. For example, enter or select the number **10m** (to represent a ten-minute previous to the point of measurement).
14. Click the button field-title **IS ABOVE** to display the menu. Depending on the alert you want, IS ABOVE, IS BELOW, IS OUTSIDE OF RANGE, IS WITHIN RANGE, or HAS NO VALUE. For example, if you want to create an alert based on the System Space, you may want to be alerted when the volume of data reaches to a certain level. In that case, you may want to select **IS ABOVE**.
15. To add more conditions, click the plus sign (**+**) below the condition you just filled out. Another Condition row displays. Repeat Steps 12-15 to complete the condition.
16. Click the appropriate field to display the menu and answer the question, "If no data or values are null, set to state…" Choose from between Alerting, No Data, Keep Last State, or Ok. The default is **No Data**.

17. Click the appropriate field to display the menu and answer the question, “If execution error or timeout…” Choose from between Alerting and Keep Last State. The default is **Alerting**.
18. To test the Alert, click **Test Rule**. The alert will go into place, regardless of the Evaluation Time you entered. If the alert fails, a red error box displays, informing you of failure. If the alert is successful, a green dialog informs you of its success and a red, vertical line displays on the graph at the moment that conditions are met. The name of the alert you created is listed when you click the Alerts panel row in the Dashboard Main Screen.
19. Once the test works, on the left side of the screen, click **Notifications**. The Notifications dialog displays.

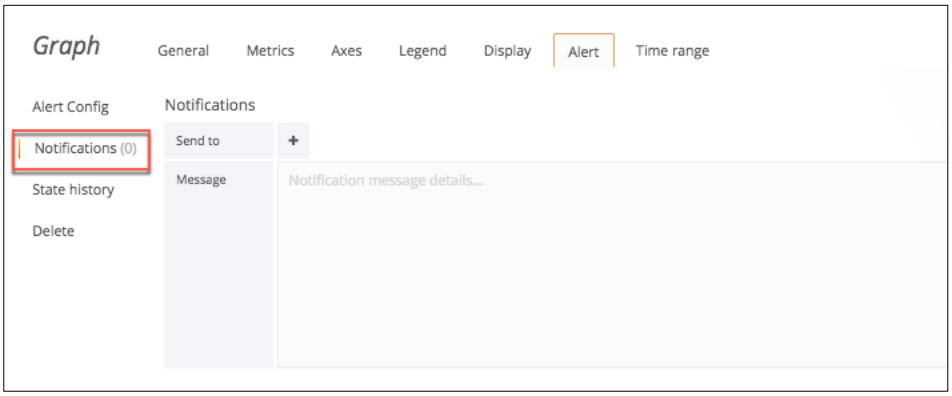


Figure 16: Create Notifications on Notification Tab

20. Next to the **Send to** field, click the plus sign (**+**) to add a notification channel of the type that you created in the preliminary Steps 2-7, above.
21. In the **Message** fields, enter the message you want sent to correspond to the alert. The message can contain anything, including information about how you might solve the issue, link to a runbook, or whatever else you might think is valuable.
22. To delete an alert, on the left side of the screen, click **Delete**.

Editing an Alert

To edit an existing alert, do the following:

1. At the top of the Dashboard Main Screen, click the **Gear** icon, select **Save As** and modify the name if you want to keep an archived version of it before making changes.
2. Click the **Alerts** panel row.
3. Click the listing of the alert you want to edit.
4. Modify the choices you want according to the descriptions above in *Creating an Alert*.
5. Click **Test Rule** to validate the modifications.

APPENDIX 1: CREATING AN API TOKEN FROM FLASHARRAY'S GUI

The following is directly from the FlashArray User's Guide, (May 10, 2017). For more information, see your guide. (For an electronic version, see FlashArray User Guides).

API tokens are used to securely create REST API sessions. After creating an API token, users can create REST API and FlashStache sessions.

An API token is unique to the Purity user for whom it was created. All users can manage and expose their own API token, but not the API tokens associated with other users. Once created, an API token is valid until it is deleted or recreated. API token management does not affect Purity usernames and passwords. We recommend using the API token of a read-only user.

Creating the API Token

To create the API token:

1. Select System > Users > API Tokens.
2. Click + Token in the upper-right corner of the API Tokens pane. The Create API Token pop-up window appears.
3. In the Name field, enter the name of the Purity user.
4. Click Create.

The API token appears in the API Token pane.

Recreating the API Token

To recreate the API token:

1. Select System > Users > API Tokens.
2. Click the menu icon for the username.
3. Select Recreate API Token.
4. The new API token appears in the API Token pane. Deleting the API token

To Delete the API Token:

1. Select System > Users > API Tokens.
2. Click the menu icon for the username.
3. Select Remove API Token.
4. Verify that the user does not appear in the API Tokens pane.

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Media |
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General |