# Build a trigger to collect custom metrics for HTTP 404 errors

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When your customers and clients cannot reach the information they need due to web page errors, you can write a trigger to help you find answers.

For example, when a customer requests a page that your HTTP server cannot find, the server responds with a 404 status code, or “page not found” error. Such responses tend to indicate that the link the customer clicked leads to an invalid URI. It would be useful to know what URI customers are trying to access and to find the referrer, or source, of the invalid link.

In this walkthrough, you will build a trigger that answers the following questions:

- Are my customers receiving "page not found" errors?
- What is the URI of the page that results in the error?
- What is the referrer that caused the error?

You will create a trigger that generates a new custom metric that returns both the invalid URI and the referrer of the invalid URI. You will also create an application that provides a tailored view of your web traffic by collecting web metrics each time a 404 status code occurs on specified devices.

## Prerequisites

- You should familiarize yourself with the concepts in this walkthrough by reading the Get started with triggers section of the ExtraHop Web UI Guide.
- You must have access to an ExtraHop Discover appliance with a user account that has limited write or full write permissions.
- Your ExtraHop appliance must have network data with web server traffic.
- It is helpful to have basic JavaScript knowledge.

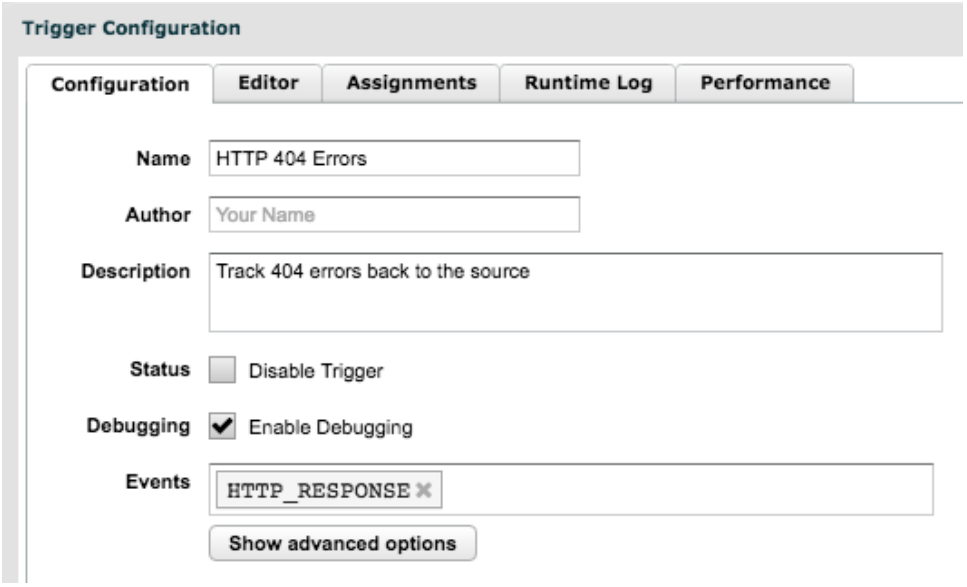
## Configure the trigger

In the following steps, you will name and describe the trigger, enable debugging, and configure the trigger to run on HTTP response events.

1. Click the System Settings icon, and then click **Triggers**.
2. Click **New** to open the Trigger Configuration window.
3. In the Configuration tab, type a name for the trigger. For this walkthrough, type `HTTP 404 Errors`.
4. Type a description of the trigger. For this walkthrough, type `Track 404 errors back to the source`.
5. Click **Enable Debugging**.
6. Click in the **Events** field and select **HTTP_RESPONSE** from the list.

   **Note:** If you click **Save Changes** after this step, the window displays an error. You cannot save the trigger if the Editor tab is empty.

The following figure displays the trigger configuration attributes you configured above:




## Write a debug statement

Next, add a simple debug statement to familiarize yourself with the trigger editor layout and features.

When the trigger runs, it seeks HTTP response events and checks if the status code in the response is 404. If a 404 status code is detected, the debug call adds the URL that the user attempted to access to the runtime log.

1. Click the **Editor** tab.
2. Add the following code to the editor:

```
if (HTTP.statusCode === 404) {
    debug (HTTP.uri);
}
```

**Tip:** The editor provides some autocomplete capabilities when typing code. For example, typing a dot (.) after selecting a class object results in a list of methods and properties applicable to the HTTP object. You can select the element you want from the list as shown in the following figure:


3. Click **Save and Close**.

## Assign the trigger to devices

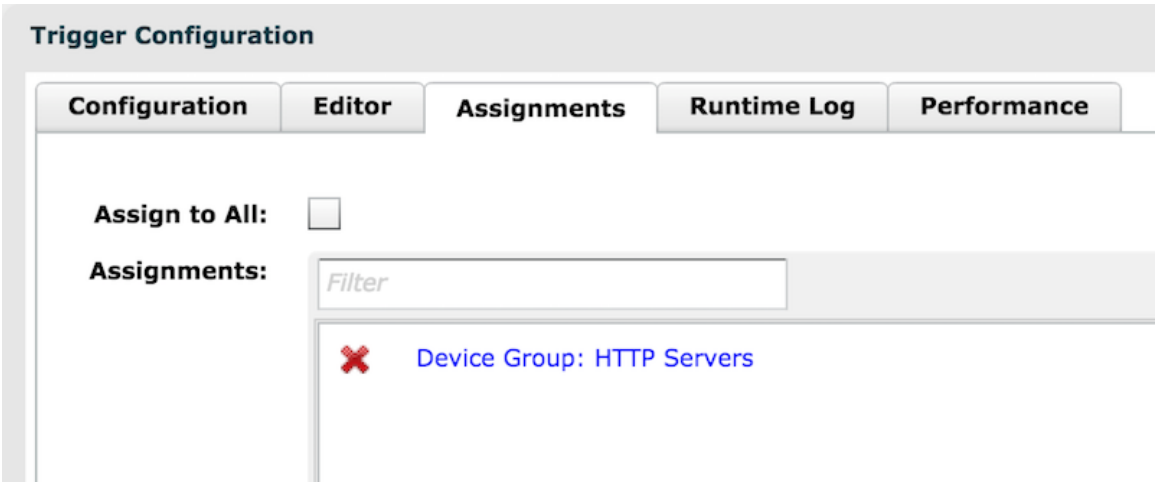
Before the trigger can log output from the debug statement, you must assign the trigger to at least one device. For this walkthrough, you will assign the trigger to the HTTP server device group.

After the trigger is assigned, the system runs the trigger each time an HTTP response occurs on any server in that group.

**Important:** When creating your own triggers, only assign triggers to the specific devices that you need to minimize the performance impact of your triggers on the system.

1. Click **Metrics** from the top menu.
2. Click **Device Groups**, and then select **HTTP Servers** checkbox.
3. Click **Assign Trigger** from the top of the page to open a list of triggers that are eligible for assignment.
4. Select the **HTTP 404 Errors** trigger, and then click **Assign Triggers**.
5. Click the **System Settings** icon, return to the Triggers page, and select the **HTTP 404 Errors** trigger to open the Trigger Configuration window.
6. In the Trigger window, click the **Assignments** tab and verify that the selected HTTP servers are added.

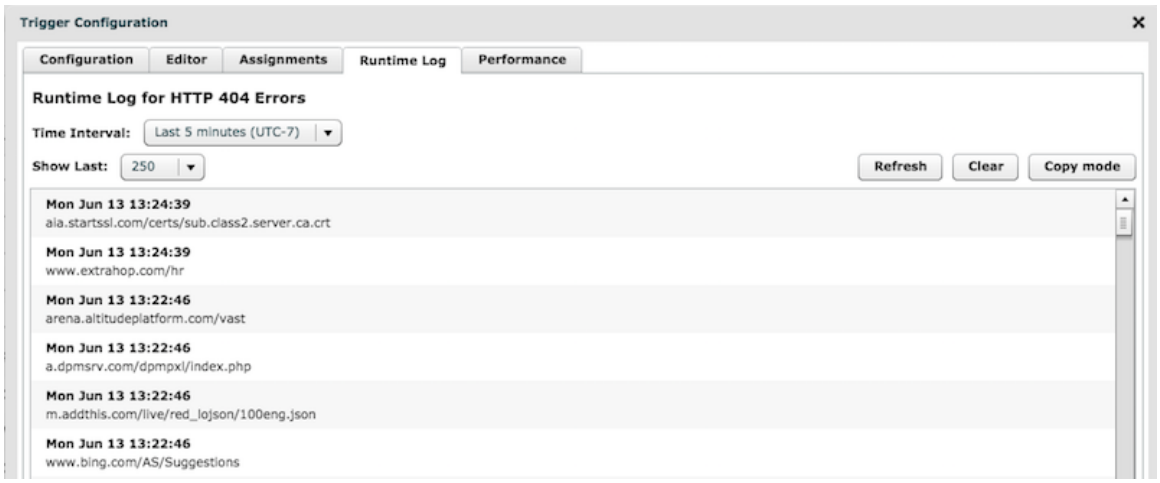
The tab should look similar to the following figure:




## View debug output

After you assign the trigger to HTTP servers, the system runs the trigger when HTTP response traffic occurs, and if any responses contain a 404 status code the system sends results to the runtime log.

To view the results of the debug statement, click the **Runtime Log** tab from the Trigger Configuration window, which should look similar to the following figure:




Debug output starts as soon as the trigger is assigned and saved; however, the log cannot display data from 404 responses that occurred prior to when the trigger was assigned and saved.

## Create a custom metric

The debug statement results have verified that there are URIs resulting in 404 status codes. In this section, you will create a custom metric named "404UriAndReferrer" to extract the invalid URIs and corresponding referrers.

The custom metric will return both the invalid URI and the referrer of the link enabling you to extract the two data sets in a single result.

To create a custom metric, you must specify a metric source from which the data is extracted, such as an application, network, or device. In this walkthrough, you will create an application named “File Not Found” as the source for the custom metric.

1. In the Trigger Configuration window, click the **Editor** tab.
2. Add the following trigger code, highlighted in green, to the existing script:

```
if (HTTP.statusCode === 404){
    debug (HTTP.uri);
    var app = Application("File Not Found");
}
```

   This code declares the application as a variable and specifies the application name. We recommend that you declare a variable for methods that you intend to call more than once to reduce resource consumption by the trigger. In this walkthrough, the code will call the application twice.

3. Add the following trigger code, highlighted in green, to the existing script:

```
if (HTTP.statusCode === 404){
    debug (HTTP.uri);
    var app = Application("File Not Found");
    app.metricAddDetailCount(
        "404UriAndReferrer",
        "404:" + HTTP.uri + " | REFERRER:" + HTTP.referer,
        1);
}
```

   The `metricAddDetailCount` method specifies the metric name and the event property data returned by the metric. The method also specifies the format of the extracted data as `404: <uri> | REFERRER: <uri>` when displayed in a chart. See the Application section of the ExtraHop Trigger API Reference for more information about custom metric methods.

4. Click **Save and Close**.

After the code is saved, the ExtraHop system adds the new custom metric to the Metric Catalog and creates the application. At this point, the application is a source for the custom metric only; the application does not collect built-in metrics. See the Metric Catalog section of the ExtraHop Web UI Guide and the Application section of the ExtraHop Trigger API Reference for more information.

## View the custom metric in a chart

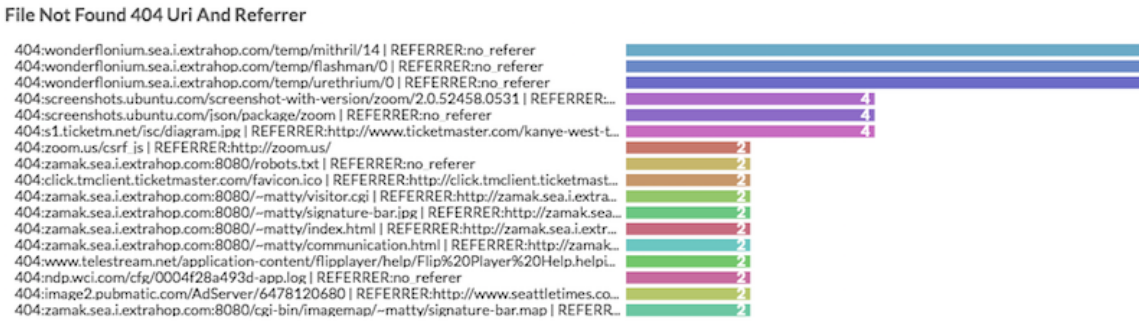
To view your custom metric, you must to add it to a chart widget on a dashboard. In the chart, the custom metric will reveal which URIs are invalid and the referrer of each invalid link.

For more information about viewing metrics on a dashboard, see the Get started with dashboards section of the ExtraHop Web UI Guide.

1. On the Dashboard page, click the command menu ⋮ in the upper right corner, and select **Create Chart**.
2. Click the empty chart widget in your newly created dashboard to launch the Metric Explorer.
3. Click **Add Source**.
4. Type and select **File Not Found**, which is the application created by the trigger.
5. In the Metrics field, type `404` and then select **404 Uri and Referrer**, which is the custom metric created by the trigger.

   **Note:** The ExtraHop system converts the custom metric name you specified in the code to a friendly display name. In this walkthrough, “404UriAndReferrer” is converted to “404 Uri And Referrer”. You can edit the friendly display name in the Metric Catalog. See the Metric Catalog section of the ExtraHop Web UI Guide for more information.
6. Select the **Bar** chart type from the bottom of the Metric Explorer.
7. In the lower right corner, click **Add to Dashboard** and select **Create Dashboard**.
8. Type a name for your dashboard in the Title field. For this walkthrough, type `HTTP 404 Errors`.
9. Click **Create**.

The chart containing data extracted from the custom metric is automatically added to the new dashboard. The dashboard output should look similar to the following figure:




## Gather built-in metrics in the application

In the previous steps, you added code to the script to create an application as the source of your new custom metric. In this section, you will add code that enables the application to gather built-in HTTP metrics, but not custom metrics, to provide a tailored view of your web traffic each time a 404 status code occurs on the specified devices.

1. In the Trigger Configure window, click the **Editor** tab.

2. Add the following trigger code, highlighted in green, to the existing script:

```
if (HTTP.statusCode === 404){
    debug (HTTP.uri);
    var app = Application("File Not Found");
    app.metricAddDetailCount(
        "404UriAndReferrer",
        "404:" + HTTP.uri + " | REFERRER:" + HTTP.referer,
        1);
    app.commit();
}
```

3. Click **Save and Close**.

## View the application and metric pages

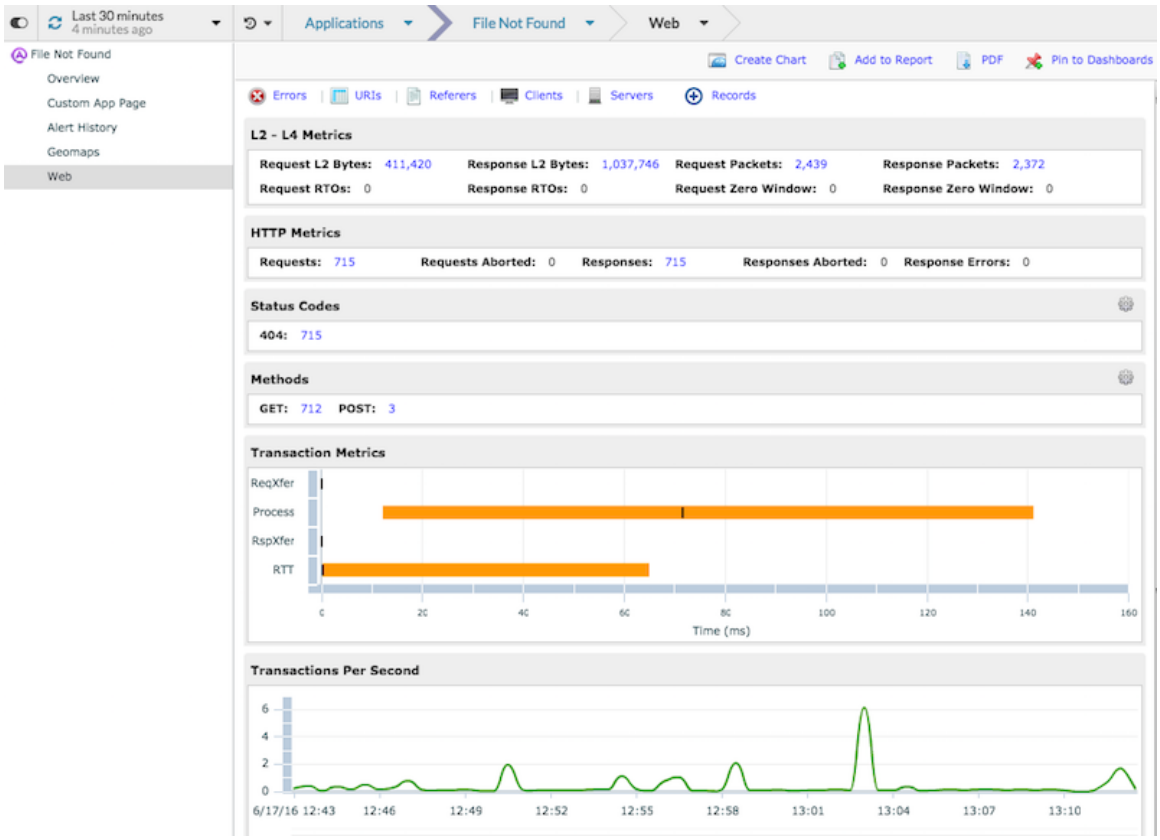
The new “File Not Found” application is created the first time the trigger runs and the conditions specified by the trigger script are met. After you commit the application, it might take several minutes before the trigger runs and data is available in the application.

The committed application adds built-in metric data relevant to the conditions defined by your trigger each time the trigger runs. In this walkthrough, built-in HTTP metrics are added to the application each time an HTTP response results in a 404 status code on the selected devices

The application displays the collected data on one or more protocol pages. Protocol pages are automatically created depending on the protocol objects included in your trigger. In this walkthrough, because the trigger runs on HTTP responses, the “File Not Found” application contains a protocol page called Web that displays built-in HTTP metrics. If you create a trigger configured to run on SSL events, the application displays a page of built-in SSL metrics, and a trigger that runs on Flow events displays a page of built-in L4 metrics.

1. Click **Metrics** from the top menu.
2. In the left pane, click **Applications**, and then select the **File Not Found** application.
3. In the left pane, click **Web** to view the built-in HTTP metrics collected in the application.

The Web page should look similar to the following figure:

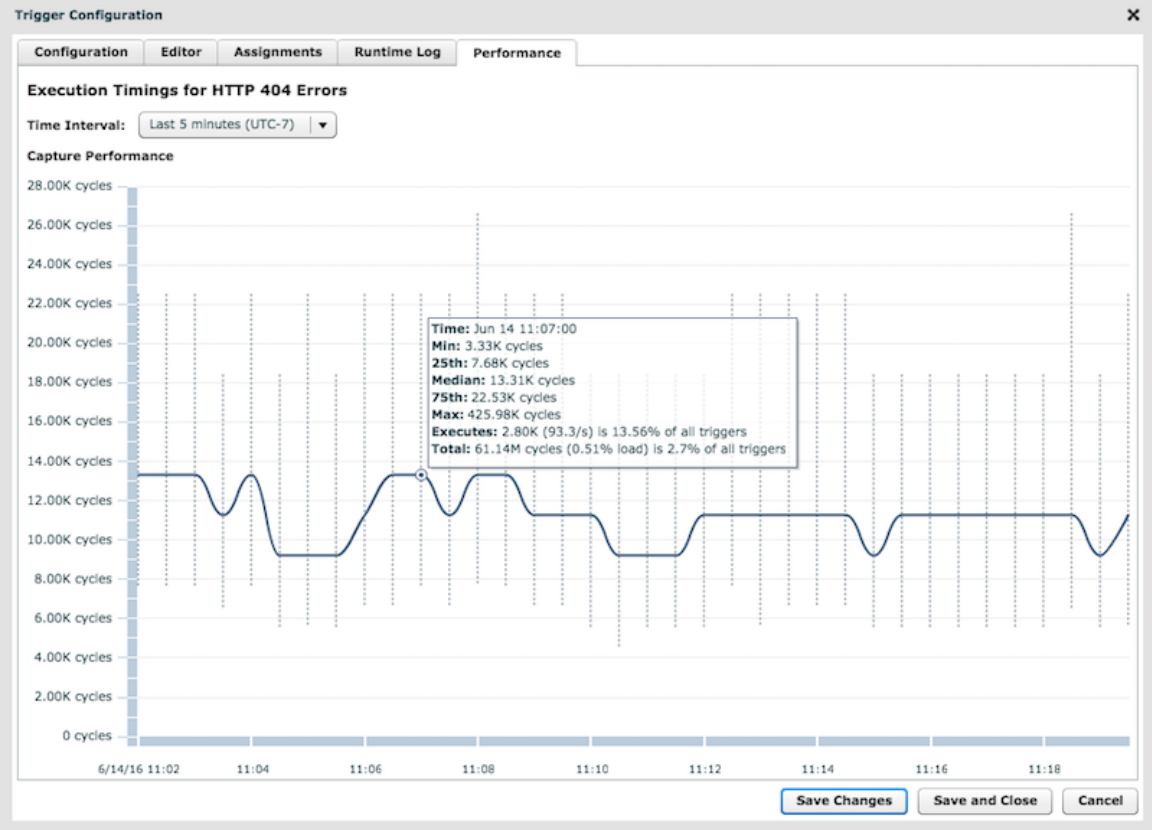



## Check the trigger performance

Triggers are a powerful tool that can provide detailed insight to your environment; however, triggers consume resources and affect system performance. In this section, you will check the performance impact of the trigger and learn about small changes you can make to improve performance.

The trigger performance graph provides the number of cycles the trigger has consumed within the specified time interval. You can hover over a data point to display details about trigger performance at a single point in time.

In the Trigger Configuration window, click the **Performance** tab; the performance graph looks similar to the following figure:




**Tip:** The System Health page in the System Settings provides additional trigger performance charts that enables you to monitor the cumulative effect of all of your triggers on the system. See the System health concepts topic.

Try making the following changes, and then check the performance graph to view any changes:

- Comment out the debug statement. You have verified that the trigger works and is collecting the custom and built-in metrics you want; you no longer need the debug output.

  **Tip:** Although you can simply disable debugging on the Configuration tab, doing so also disables monitoring on the Performance tab. Comment out the debug statement to continue monitoring the performance of this trigger.
- Reassign the trigger to specific devices instead of all HTTP servers in the activity group.

For additional trigger optimization tips and tricks, see the ExtraHop Trigger API Reference and the following Trigger Optimization 101 blog posts in the ExtraHop Community Forums:

- Trigger Optimization 101: Accessing Metrics
- Trigger Optimization 101: Return Quickly
- Trigger Optimization 101: Exception Handling
- Trigger Optimization 101: Return or Exit()?