

API Diagnostics : Trace Tool

Duration : 20 mins

Persona : API Team / DevOps

Use case

One of your team members is complaining that the API call is returning an error. You are asked to monitor the traffic and debug the issue.

How can Apigee Edge help?

The Trace component in Edge is a powerful tool for troubleshooting and monitoring API proxy behavior. Trace features an intuitive visual graph which outlines each step in an API proxy flow -- request, response, policies, etc. Drill into each step to understand its impact on proxy behavior, filter your view to zero in on specific requests, and export your Trace session for non-real-time diagnostics.

In this lab, we will configure your proxy to expect a new query parameter -- called "initials" (your initials). We will then use the trace tool to find the root cause of a 404 error, filtering the view to show only those requests containing your initials.

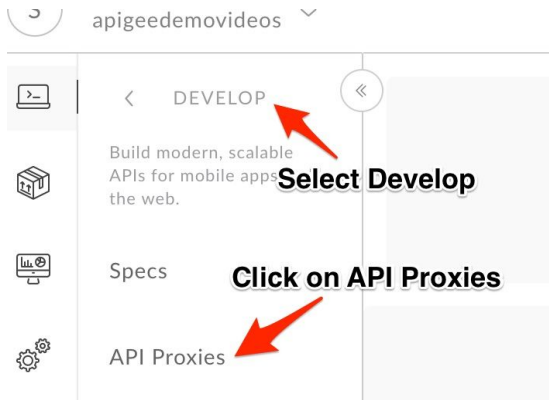
Pre-requisites

You have an API proxy created in Apigee Edge. If not, jump back to the "Create Reverse Proxy with OpenAPI specification" lab.

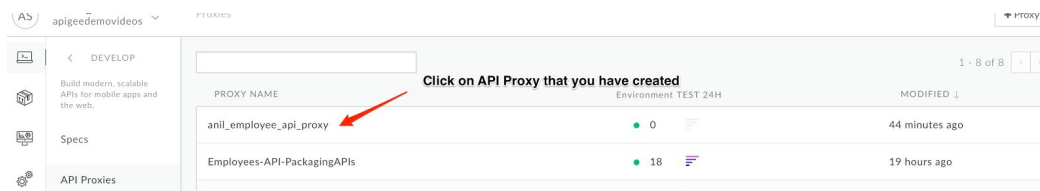
Instructions

Part 1 - Configure API Proxy

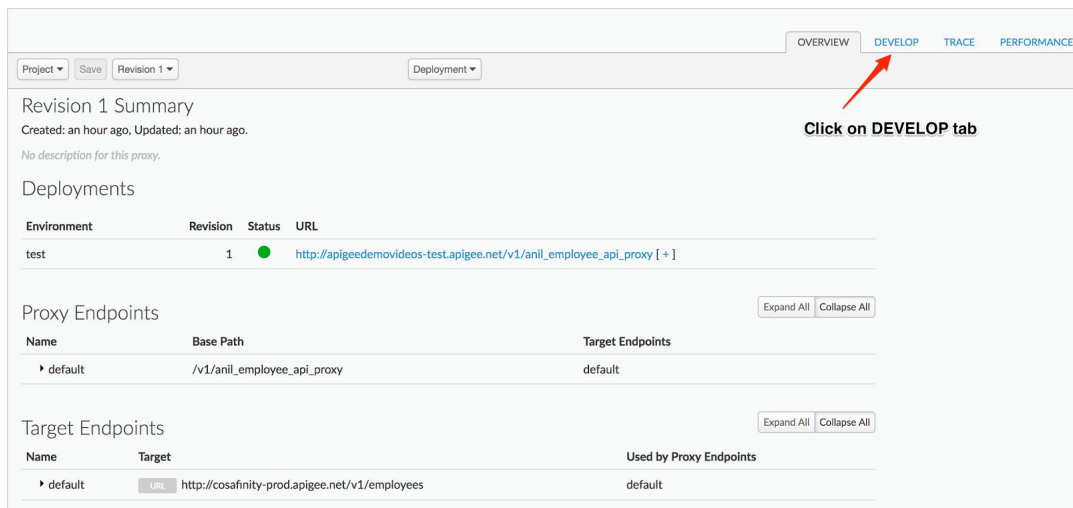
- Go to <https://apigee.com/edge> and log in. This is the Edge management UI.
- Select **Develop** → **API Proxies** in the side navigation menu



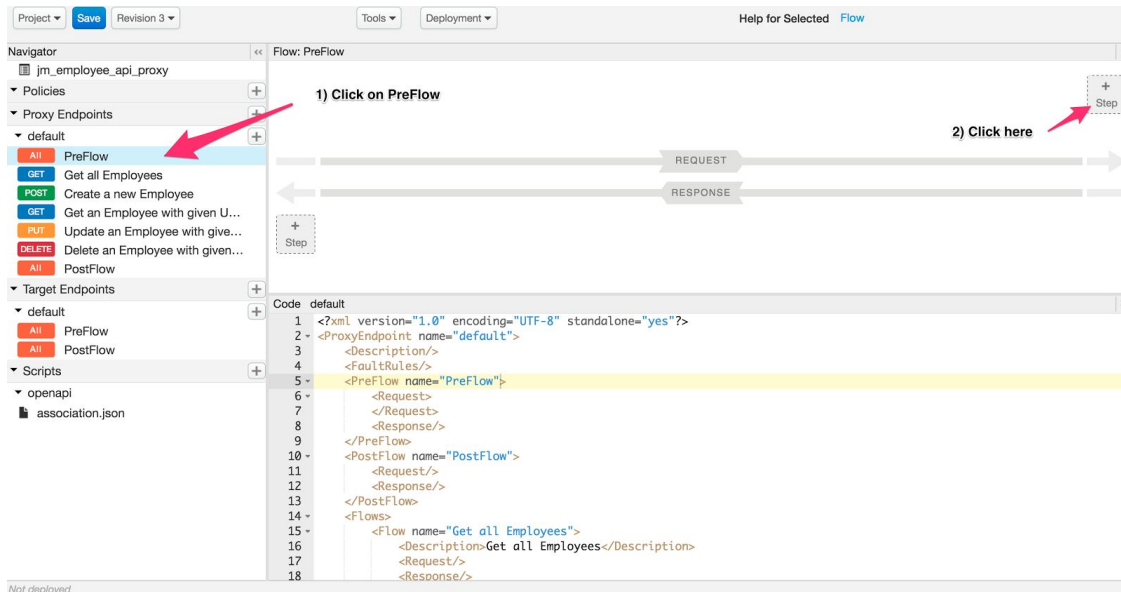
- Select the **{your_initials}_employee_api_proxy** that you created in an earlier lab exercise.



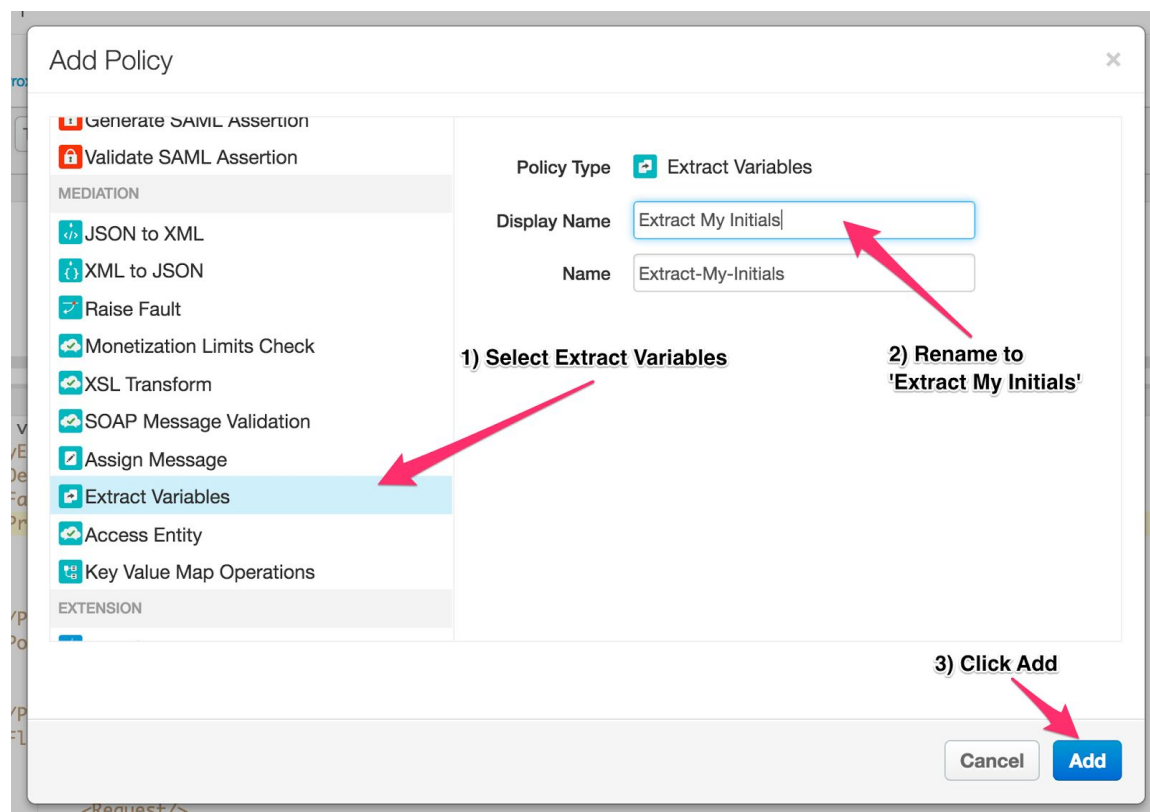
- Click on the **Develop** tab to access the API Proxy development dashboard.



- Click on **PreFlow** under Proxy Endpoints default, Click on **+ Step** on the Request flow to attach an *Extract Variables* policy.



- Select **Extract Variables Policy**, name the policy “Extract My Initials”, and click on the **Add** button to add the Extract Variables policy.



Note: The Extract Variables policy icon is visible on the request flow and shows exactly where the policy is attached. Corresponding XML (in keeping with Edge's config-then-code approach) can be seen in an edit pane below.

Flow: PreFlow

Extract Variable Policy

Extract My Init...

REQUEST

RESPONSE

Endpoint default Policy Extract My Initials

```

1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 <ExtractVariables async="false" continueOnError="false" enabled="true" name="Extract-My-Initials">
3   <DisplayName>Extract My Initials</DisplayName>
4   <Properties/>
5   <URIPath name="name"/>
6   <QueryParam name="name"/>
7   <Header name="name"/>
8   <FormParam name="name"/>
9   <Variable name="name"/>
10  <IgnoreUnresolvedVariables>true</IgnoreUnresolvedVariables>
11 </ExtractVariables>
12 <JSONPayload>
13   <Variable name="name">
14     <JSONPath>{example}</JSONPath>
15   </Variable>
16 </JSONPayload>
17 <Source clearPayload="false">request</Source>
18 <VariablePrefix>apigee</VariablePrefix>
19 <XMLPayload stopPayloadProcessing="false">
20   <Namespaces/>

```

Corresponding XML Config

- Change the Policy XML configuration to match the code below. Doing so will “teach” your proxy to extract your initials from a query parameter in the API request.

Note!!! In the following snippet, the Pattern value that reads “{my_initials}” is referencing a variable in your API proxy called *my_initials*, you do not need to replace this with your initials.

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ExtractVariables async="false" continueOnError="false"
enabled="true" name="Extract-Initials">
  <DisplayName>Extract My Initials</DisplayName>
  <Properties/>
  <QueryParam name="initials">
    <Pattern ignoreCase="true">{my_initials}</Pattern>
  </QueryParam>
</ExtractVariables>

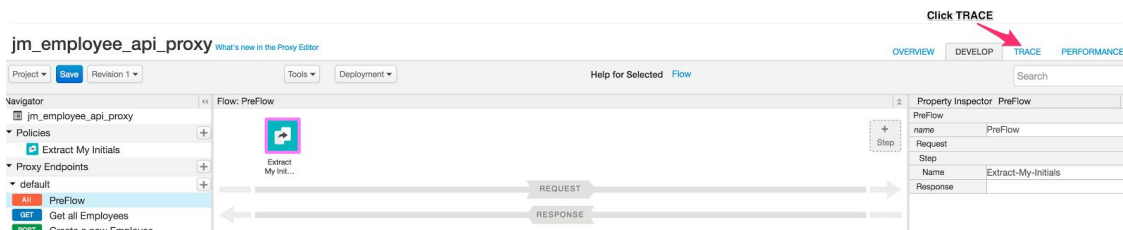
```

- **Save your proxy** and wait for it to successfully deploy

Part 2 - Trace and Troubleshoot

Consider a scenario where one of your API consumers reports seeing 404 errors in response to their requests. How would you get to the bottom of this issue? The Trace tool allows you to isolate that user's requests and step through proxy logic one step at a time. Let's send some traceable requests -- note the failure -- and attempt to understand why it's failing.

- Click on the **TRACE** tab to access the real-time API Trace tool.

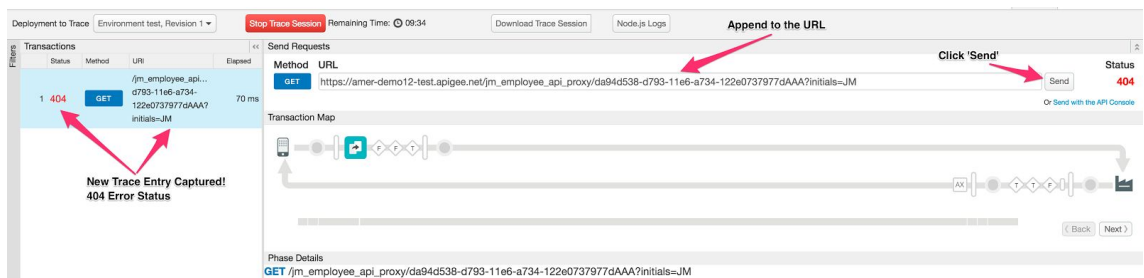


- Locate the URL field and append the following to the end

```
/da94d538-d793-11e6-a734-122e0737977dAAA?initials={your initials}
```

(update above {your initials} with your actual initials & remove the braces)

- Click the green **Start Trace Session** button, then click **Send**. Note a trace log is captured, with a 404 response.



- Step through the visualization, clicking points of interest along the request/response flow and taking note of the metadata provided at the bottom of the screen.

Transactions

Status	Method	URI	Elapsed
1 404	GET	/jm_employee_api_proxy/da94d538-d793-11e6-a734-122e0737977dAAA?initials=JM	88 ms

Send Requests

Method: GET, URL: https://amer-demo12-test.apigee.net/jm_employee_api_proxy/da94d538-d793-11e6-a734-122e0737977dAAA?initials=JM, Status: 404

Transaction Map

Extract Variables Policy Selected

1ms Required to execute this policy

Phase Details

Extract My Initials
GET /jm_employee_api_proxy/da94d538-d793-11e6-a734-122e0737977dAAA?initials=JM

Variables Assigned

Variable	Value
my_initials	= JM
apigee.metrics.policy.Extract-Initials.timeTaken	= 210254

Request Headers

Header	Value
Accept	/*/*
Accept-Encoding	gzip,deflate
Host	amer-demo12-test.apigee.net
User-Agent	NING/1.0
X-Forwarded-For	54.209.253.240
X-Forwarded-Port	443
X-Forwarded-Proto	https

Output from all Transactions

Trace-Step 1: Extract Variables Policy

Send Requests

Method: GET, URL: https://amer-demo12-test.apigee.net/jm_employee_api_proxy/da94d538-d793-11e6-a734-122e0737977dAAA?initials=JM, Status: 404

Transaction Map

Next Step in Execution

Phase Details

Request sent to target server
GET http://cosafinity-prod.apigee.net/v1/employees/da94d538-d793-11e6-a734-122e0737977dAAA?initials=JM

Request Headers

Header	Value
Accept	/*/*
Accept-Encoding	gzip,deflate
Host	amer-demo12-test.apigee.net
User-Agent	NING/1.0
X-Forwarded-For	54.209.253.240
X-Forwarded-Port	443
X-Forwarded-Proto	https

Request Content

Output from all Transactions

Trace-Step 2: Request sent to target

Send Requests

Method: GET URL: https://amer-demo12-test.apigee.net/jm_employee_api_proxy/da94d538-d793-11e6-a734-122e0737977dAAA?initials=JM Status: 404

Transaction Map

Next Step: Response from Target

73ms

Phase Details

Content-type	application/json
Date	Tue, 17 Jan 2017 13:02:12 GMT
Server	Apache-Coyote/1.1
Set-Cookie	rememberMe=deleteMe; Path=/; Max-Age=0; Expires=Mon,16-Jan-2017 13:02:12 GMT

Response Content

Body

```
{
  "error": "entity_not_found",
  "timestamp": 1484658132888,
  "duration": 0,
  "error_description": "Cannot find entity with name: da94d538-d793-11e6-a734-122e0737977daaa",
  "exception": "org.apache.usergrid.persistence.exceptions.EntityNotFoundException"
}
```

Properties

Trace-Step 3: Response returned from target

Congratulations! You've found the problem. Your target service cannot find an entity with the ID provided (7ed25ec5-c89f-11e6-861b-0ad881f403bfaaa). This is a trivial example, but you can see how the tool -- providing before and after insight into message, query, and header contents -- would be of immense use in diagnosing malformed requests and other common issues.

- Edit your URL field once more to follow the pattern below

`/da94d538-d793-11e6-a734-122e0737977d?initials={your initials}`

(update above {your initials} with your actual initials & remove the braces)

- Click the **send** button again.
- Note - this time, your request returns a valid JSON response.

Transactions

Index	Status	Method	URL	Elapsed
2	200	GET	/jm_employee_api... d793-11e6-a734-122e0737977d?initials=JM	74 ms
1	404	GET	/jm_employee_api... d793-11e6-a734-122e0737977dAAA?initials=JM	73 ms

Send Requests

Method: GET URL: https://amer-demo12-test.apigee.net/jm_employee_api_proxy/da94d538-d793-11e6-a734-122e0737977d?initials=JM Status: 200

Transaction Map

Employee JSON, as expected

70ms

Phase Details

Server	Apache-Coyote/1.1
Set-Cookie	rememberMe=deleteMe; Path=/; Max-Age=0; Expires=Mon,16-Jan-2017 13:20:33 GMT

Response Content

Body

```
{
  "uuid": "da94d538-d793-11e6-a734-122e0737977d",
  "type": "employee",
  "name": "Puckett Williamson",
  "created": 1484094070873,
  "modified": 1484094070873,
  "birthDate": "11-24",
  "city": "Manitowoc",
  "department": "IT",
  "email": "puckettwilliamson@inquila.com",
  "gender": "male",
  "isActive": true,
  "location": {
    "latitude": 44.1156727,
    "longitude": -87.6624432
  },
  "metadata": {
    "path": "\\employees\\da94d538-d793-11e6-a734-122e0737977d",
    "size": 637,
    "phone": "+1 (852) 576-3323",
    "postal": "54220",
    "state": "WI",
    "street": "1609 Hillcrest Dr"
  }
}
```

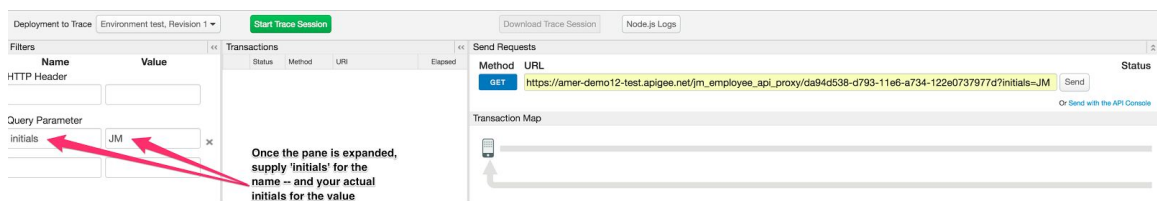
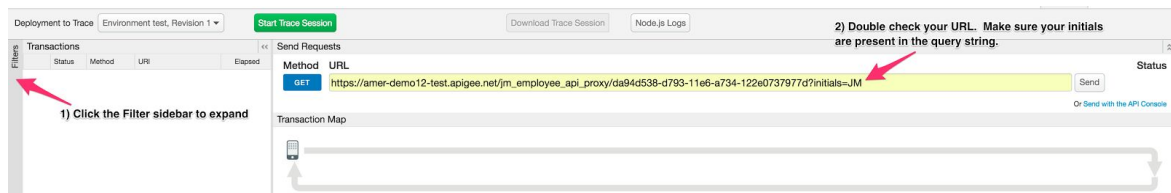
Part 3 - Filtering

Now, imagine troubleshooting this issue - except with hundreds or thousands of requests flowing through the system at a given time. Fortunately, the Trace tool can filter its real-time capture so that it only shows entries with a given query or header parameter.

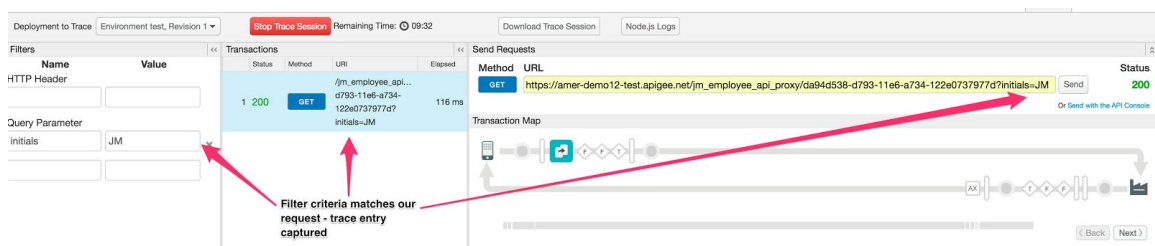
- Click the red **Stop Trace Session** button.
- Expand the filters pane on the left side of your screen. Then add a query parameter filter named 'initials'. Put your initials in the value column and ensure the URL also holds your initials, like before.

Example:

```
/da94d538-d793-11e6-a734-122e0737977d?initials={your initials}
```



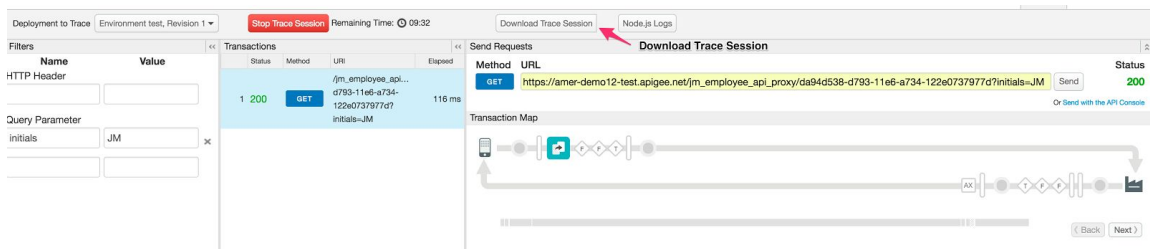
- Click the green **Start Trace Session** button, then click the **Send** button again to fire another API call. Note the captured trace entry.



- Update the URL with a new, fake value for the initials query parameter. Example below.

```
/7ed25ec5-c89f-11e6-861b-0ad881f403bf?initials=xyz
```

- Click the **send** button. Note: No matter how many times you click send, no new trace entry is captured! This is expected behavior, as our filter is configured to only trace requests with your initials in the query.
- One more thing -- with your trace session still active, click the **Download Trace Session** button to export a record of the trace results. You'll need this for the extra credit.



So you've diagnosed a real-time problem with your API and distilled the information down to show only requests relevant to your investigation. In a true-to-life scenario, you'd likely filter on API key or another, more sophisticated identifier than initials.

Lab Video

If you prefer to learn by watching, here is a video lab on using the Trace tool

<https://youtu.be/luCU2XTh5J0>

Earn Extra-points

Take a few minutes and explore the Trace interface a bit deeper. Hover over the steps in the request/response visualization and note the Latency bubble that pops up, showing you how much time elapsed at that particular step. Drill into the metadata in the bottom window. Click the 'Extract Variables' policy and note that the initials you provided are shown as an extracted variable called 'my_initials'.

Finally, take a look at the exported trace session from the lab. See if you can interpret the results -- imagine some scenarios where this export could be ingested into other tools for offline diagnostics.

Quiz

1. Name two kinds of metadata the Trace tool provides you with.
2. What criteria can be used to filter Trace results?

Summary

In this lab, you learned how to diagnose a reported problem with your API in real-time using the Trace tool. You learned how to filter those results down to a relevant subset of data -- and how to export the results for later review.

References

- Apigee Docs: Trace. <http://docs.apigee.com/api-services/content/using-trace-tool-0>
- Apigee Community on Tracing: <https://community.apigee.com/topics/trace.html>
- Watch this 4minute video to learn about the Trace Tool
 - <https://community.apigee.com/articles/36248/apigee-4mv4d-api-proxy-trace-console.html>

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