Analyze Jaeger trace data

INTRODUCED 2.5

The trace analytics functionality in the OpenSearch Observability plugin now supports Jaeger trace data. If you use OpenSearch as the backend for Jaeger trace data, you can use the trace analytics built-in analysis capabilities. This provides support for OpenTelemetry (OTEL) formatted trace data.

When you perform trace analytics, you can select from two data sources:

- **Data Prepper** – Data ingested into OpenSearch through Data Prepper.
- **Jaeger** – Trace data stored within OpenSearch as its backend.

If you currently store your Jaeger trace data in OpenSearch, you can now use the capabilities built into trace analytics to analyze the error rates and latency. You can also filter the traces and look into the span details of a trace to pinpoint any service issues.

When you ingest Jaeger data into OpenSearch, it gets stored in a different index than the OTEL-generated index that gets created when you run data through Data Prepper. Use the data source selector in Dashboards to indicate on which data source you want to perform trace analytics.

Jaeger trace data that you can analyze includes span data, as well as service and operation endpoint data.

By default, each time you ingest data for Jaeger, it creates a separate index for that day.

To learn more about Jaeger data tracing, see the Jaeger open source documentation.

Data ingestion requirements

To use trace analytics with Jaeger data, you need to configure error capability.

Jaeger data that is ingested for OpenSearch needs to have the environment variable `ES_TAGS_AS_FIELDS_ALL` set to `true` for errors. If data is not ingested in this format it will not work for errors and error data will not be available for traces in trace analytics with OpenSearch.

About data ingestion with Jaeger indexes

Trace analytics for non-Jaeger data use OTEL indexes with the naming conventions `otel-v1-apm-span-*` or `otel-v1-apm-service-map*`.

Jaeger indexes follow the naming conventions `jaeger-span-*` or `jaeger-service-*`.

How to set up OpenSearch to use Jaeger data

The following section provides a sample Docker compose file that contains the required configuration to enable errors for trace analytics.

Step 1: Run the Docker compose file

Use the following Docker compose file to enable Jaeger data for trace analytics with the `ES_TAGS_AS_FIELDS_ALL` environment variable set to `true` to enable errors to be added to trace data.

Copy the following Docker compose file contents and save it as `docker-compose.yml`.

```
version: '3'
services:
  opensearch-node1: # This is also the hostname of the container within the Docker n
    image: opensearchproject/opensearch:latest # Specifying the latest available ima
    container_name: opensearch-node1
    environment:
      - cluster.name=opensearch-cluster # Name the cluster
      - node.name=opensearch-node1 # Name the node that will run in this container
      - discovery.seed_hosts=opensearch-node1,opensearch-node2 # Nodes to look for w
      - cluster.initial_cluster_manager_nodes=opensearch-node1,opensearch-node2 # No
      - bootstrap.memory_lock=true # Disable JVM heap memory swapping
      - "OPENSEARCH_JAVA_OPTS=-Xms512m -Xmx512m" # Set min and max JVM heap sizes to
    ulimits:
      memlock:
        soft: -1 # Set memlock to unlimited (no soft or hard limit)
        hard: -1
      nofile:
        soft: 65536 # Maximum number of open files for the opensearch user - set to
        hard: 65536
    volumes:
      - opensearch-data1:/usr/share/opensearch/data # Creates volume called opensear
    ports:
      - "9200:9200"
      - "9600:9600"
    networks:
      - opensearch-net # All of the containers will join the same Docker bridge netw

  opensearch-node2:
    image: opensearchproject/opensearch:latest # This should be the same image used
    container_name: opensearch-node2
    environment:
      - cluster.name=opensearch-cluster
      - node.name=opensearch-node2
      - discovery.seed_hosts=opensearch-node1,opensearch-node2
      - cluster.initial_cluster_manager_nodes=opensearch-node1,opensearch-node2
      - bootstrap.memory_lock=true
      - "OPENSEARCH_JAVA_OPTS=-Xms512m -Xmx512m"
    ulimits:
      memlock:
        soft: -1
        hard: -1
      nofile:
        soft: 65536
        hard: 65536
    volumes:
      - opensearch-data2:/usr/share/opensearch/data
    networks:
      - opensearch-net
  opensearch-dashboards:
    image: opensearchproject/opensearch-dashboards:latest # Make sure the version of
    container_name: opensearch-dashboards
    ports:
      - 5601:5601 # Map host port 5601 to container port 5601
    expose:
      - "5601" # Expose port 5601 for web access to OpenSearch Dashboards
    environment:
      OPENSEARCH_HOSTS: '["https://opensearch-node1:9200","https://opensearch-node2:
    networks:
      - opensearch-net

  jaeger-collector:
    image: jaegertracing/jaeger-collector:latest
    ports:
      - "14269:14269"
      - "14268:14268"
      - "14267:14267"
      - "14250:14250"
      - "9411:9411"
    networks:
      - opensearch-net
    restart: on-failure
    environment:
      - SPAN_STORAGE_TYPE=opensearch
      - ES_TAGS_AS_FIELDS_ALL=true
      - ES_USERNAME=admin
      - ES_PASSWORD=admin
      - ES_TLS_SKIP_HOST_VERIFY=true
    command: [
      "--es.server-urls=https://opensearch-node1:9200",
      "--es.tls.enabled=true",
    ]
    depends_on:
      - opensearch-node1

  jaeger-agent:
    image: jaegertracing/jaeger-agent:latest
    hostname: jaeger-agent
    command: ["--reporter.grpc.host-port=jaeger-collector:14250"]
    ports:
      - "5775:5775/udp"
      - "6831:6831/udp"
      - "6832:6832/udp"
      - "5778:5778"
    networks:
      - opensearch-net
    restart: on-failure
    environment:
      - SPAN_STORAGE_TYPE=opensearch
    depends_on:
      - jaeger-collector

  hotrod:
    image: jaegertracing/example-hotrod:latest
    ports:
      - "8080:8080"
    command: ["all"]
    environment:
      - JAEGER_AGENT_HOST=jaeger-agent
      - JAEGER_AGENT_PORT=6831
    networks:
      - opensearch-net
    depends_on:
      - jaeger-agent

volumes:
  opensearch-data1:
  opensearch-data2:

networks:
  opensearch-net:
```

Step 2: Start the cluster

Run the following command to deploy the Docker compose YAML file.

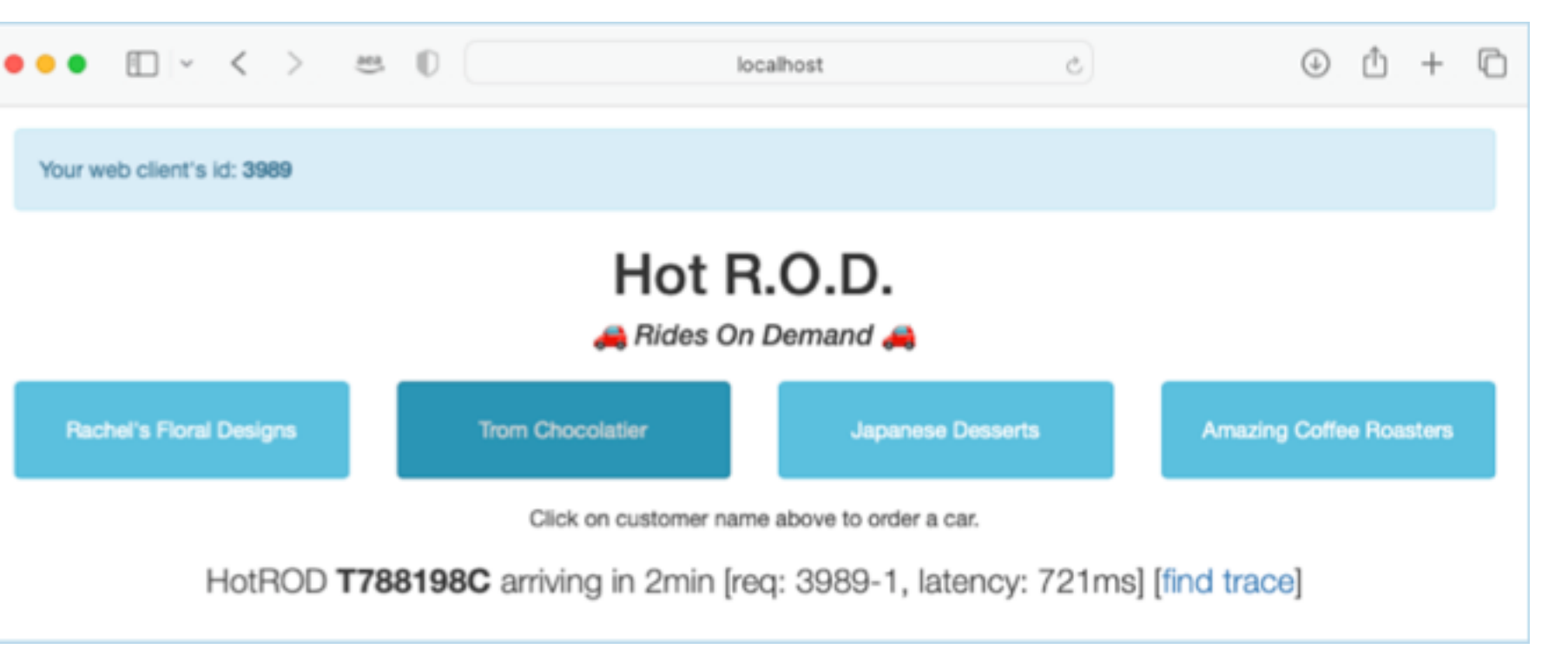
```
docker compose up -d
```

To stop the cluster, run the following command:

```
docker compose down
```

Step 2: Generate sample data

Use the sample app provided with the Docker file to generate data. After you run the Docker compose file, it runs the sample app in your local host port 8080. To open the app, go to http://localhost:8080.



In the sample app, Hot R.O.D., select any one of the buttons to generate data. Now you can view trace data in Dashboards.

Step 3: View trace data in OpenSearch Dashboards

After you generate Jaeger trace data you can go to OpenSearch Dashboards to view your trace data.

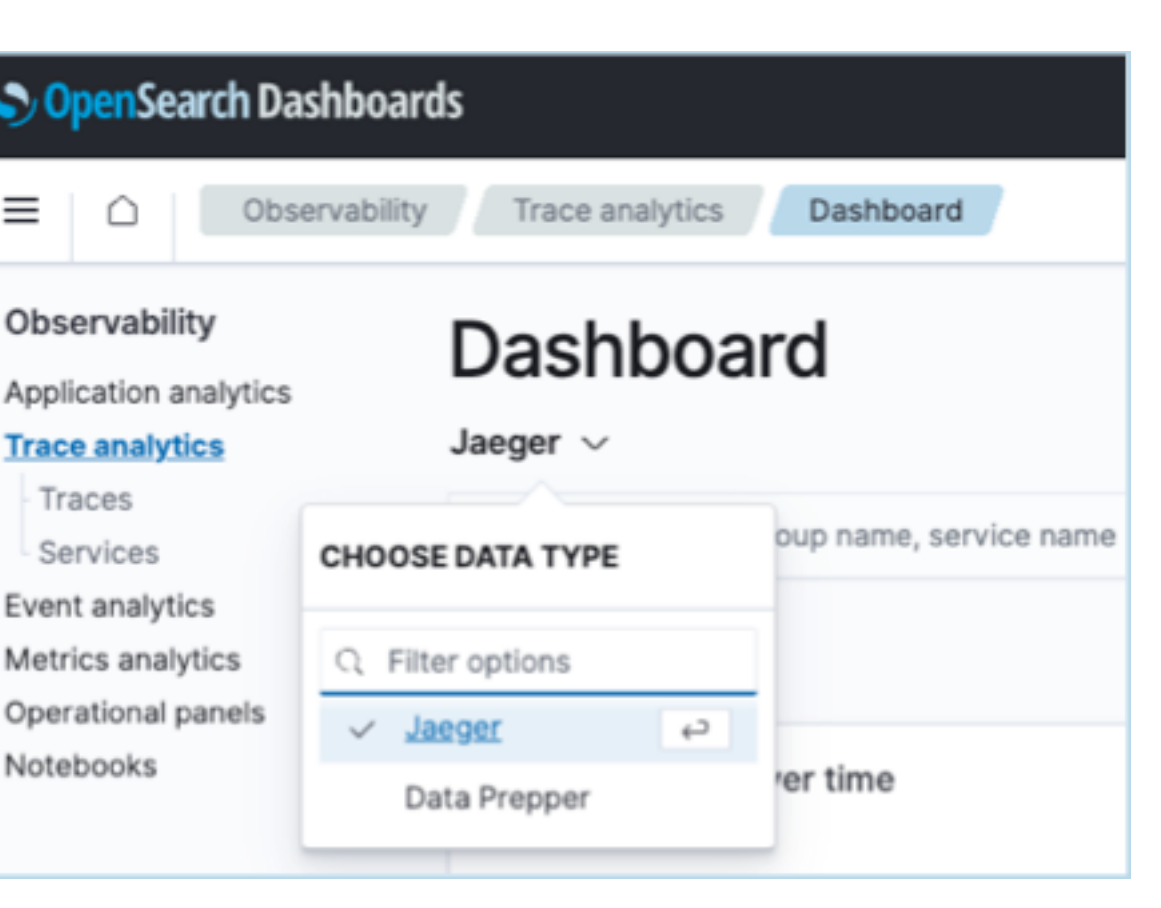
Go to Dashboards **Trace analytics** at http://localhost:5601/app/observability-dashboards#/trace_analytics/home.

Use trace analytics in OpenSearch Dashboards

To analyze the Jaeger trace data in Dashboards, first set up the trace analytics functionality. To get started, see Get started with trace analytics.

Data sources

You can specify either Data Prepper or Jaeger as the data source when you perform trace analytics. From Dashboards, go to **Observability > Trace analytics** and select Jaeger.

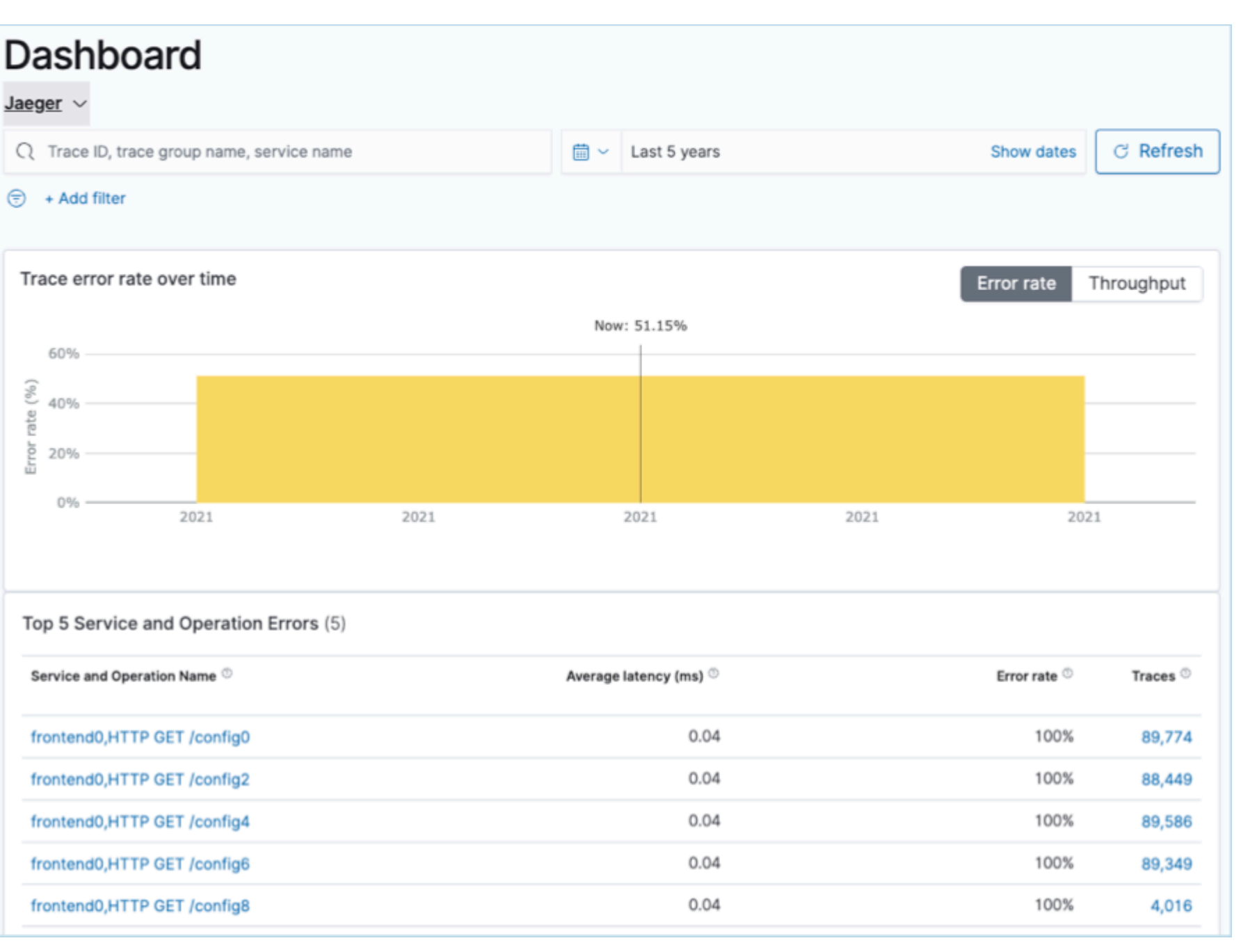


Dashboard view

After you select Jaeger for the data source, you can view all of the indexed data in **Dashboard** view, including **Error rate** and **Throughput**.

Error rate

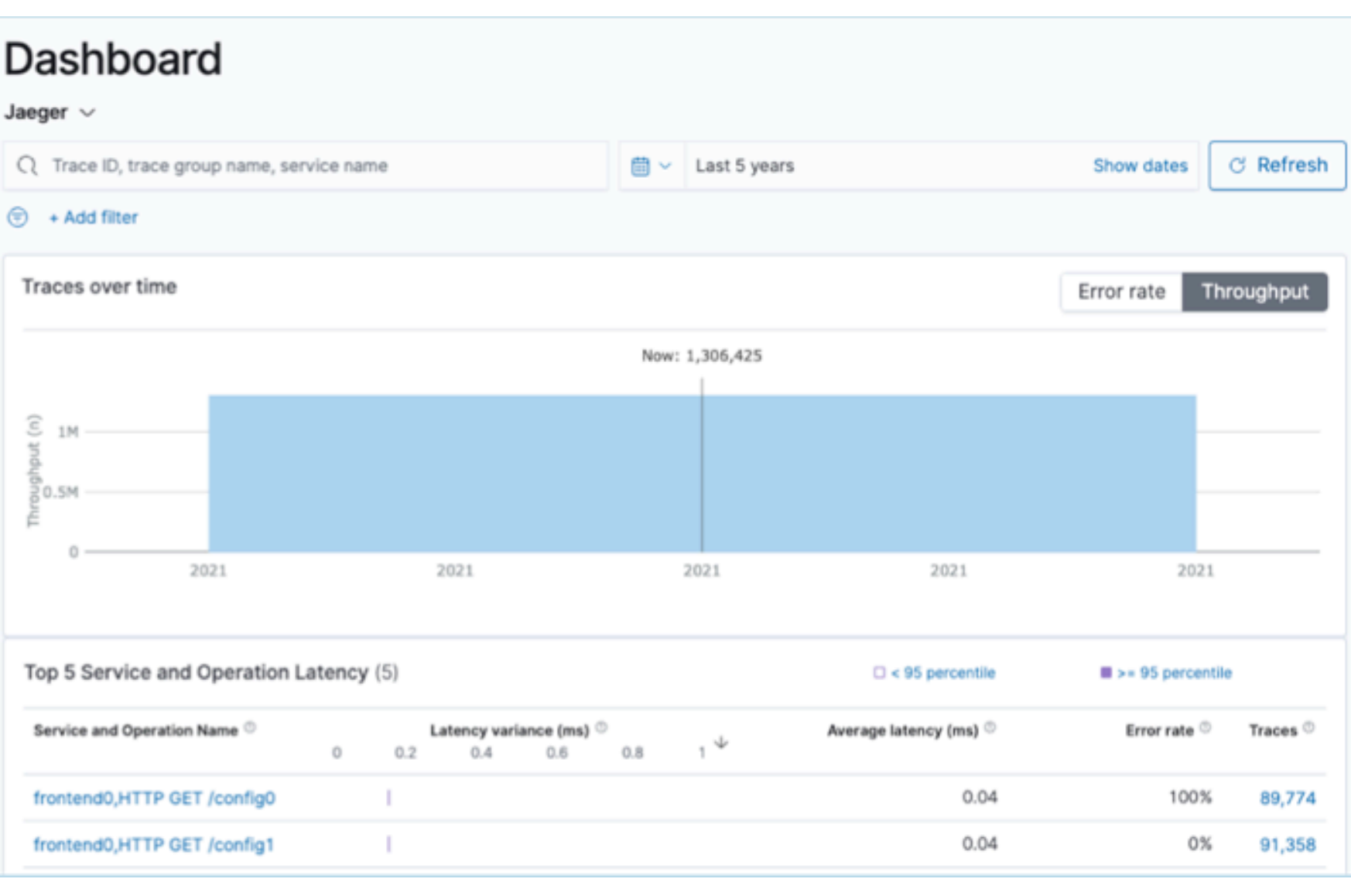
You can view the trace error count over time in the **Dashboard** view and also see the top five combinations of services and operations that have a non-zero error rate.



Throughput

With **Throughput** selected, you can see the throughput of traces on Jaeger indexes that are coming in over time.

You can select an individual trace from **Top 5 Service and Operation Latency** list and view the detailed trace data.

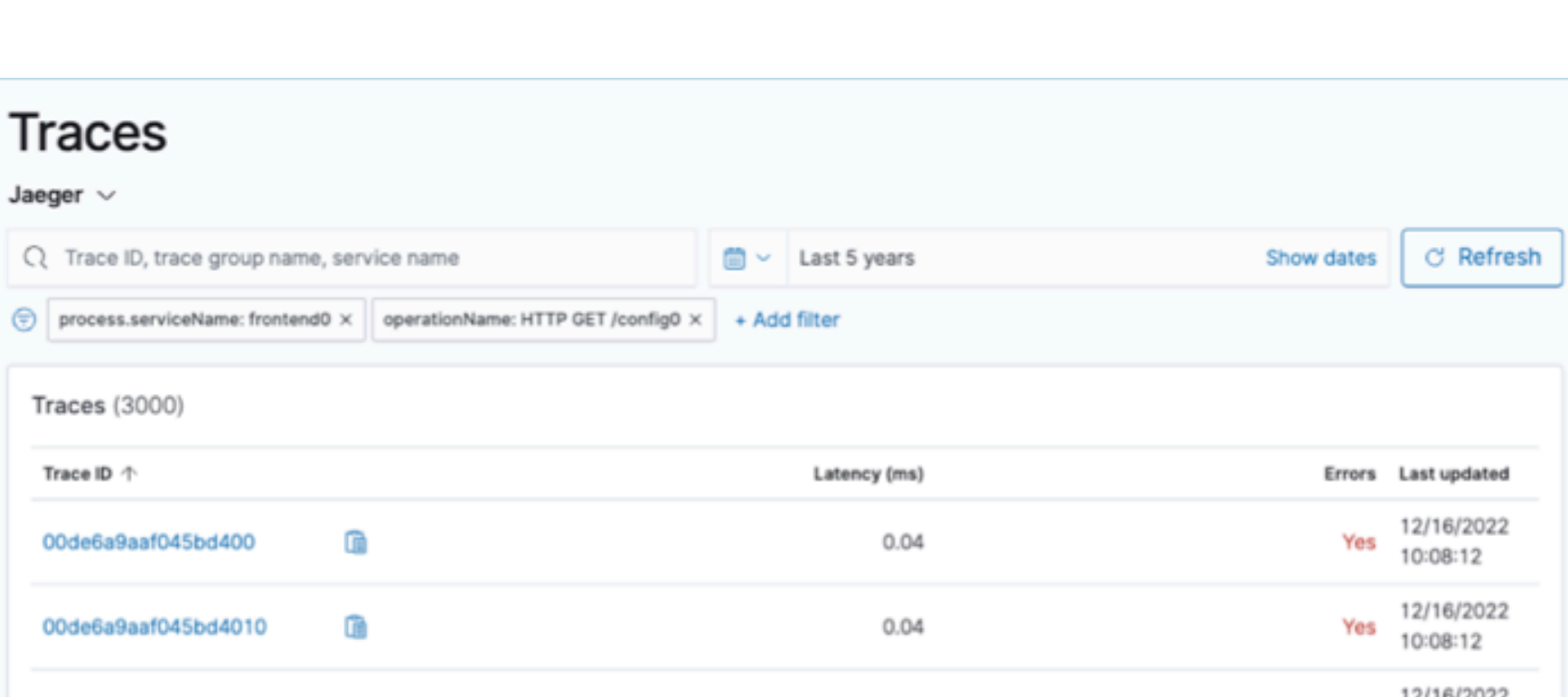


You can also see the combinations of services and operations that have the highest latency.

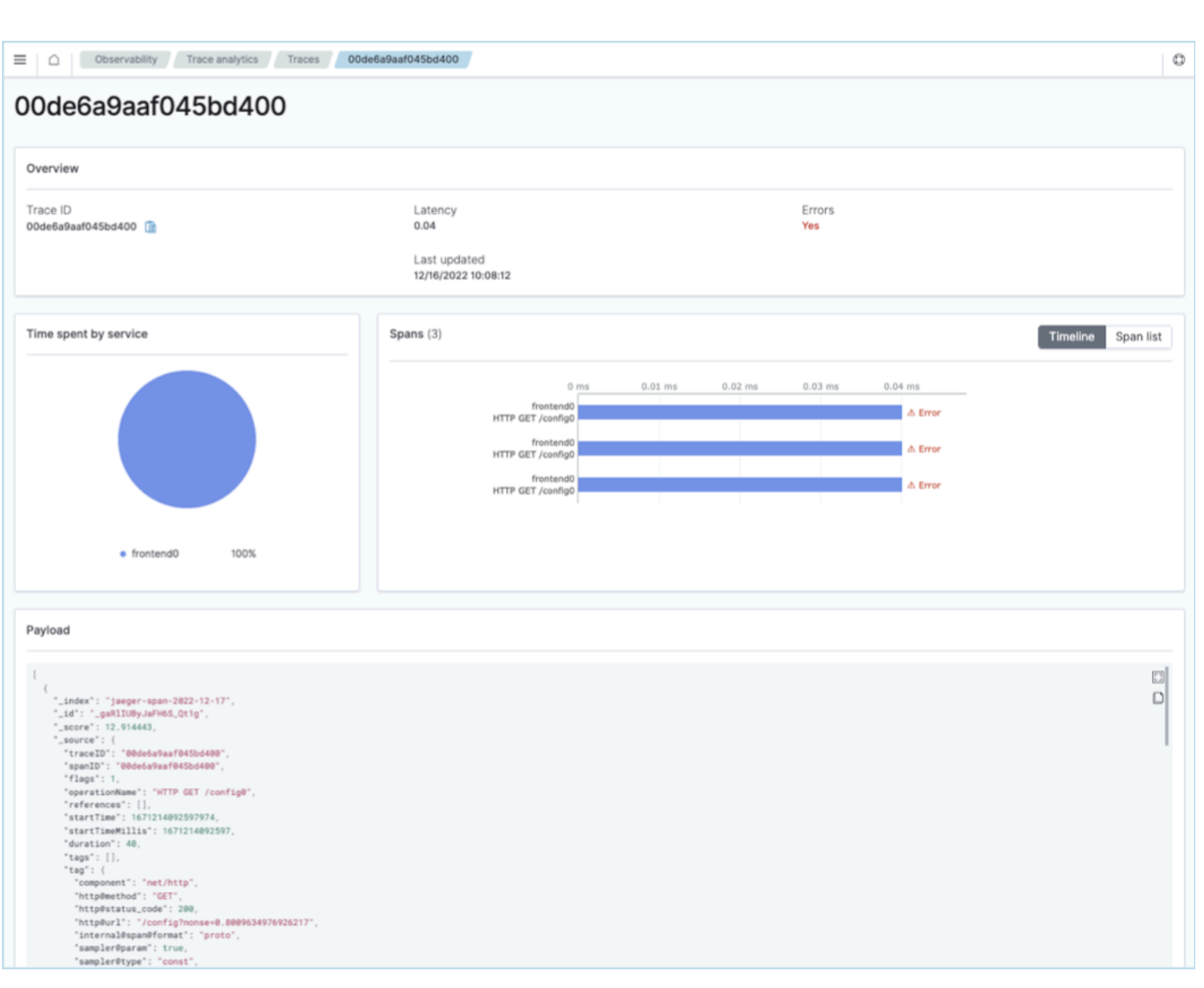
If you select one of the entries for Service and Operation Name and go to the **Traces** column to select a trace, it will automatically add the service and operation as filters.

Traces

In **Traces**, you can see the latency and errors for the filtered service and operation for each individual Trace ID in the list.



If you select an individual Trace ID, you can see more detailed information about the trace, such as time spent by the service and each span for the service and operation. You can also view the payload that you get from the index in JSON format.



Services

You can also look at individual error rates and latency for each individual service. Go to **Observability > Trace analytics > Services**. In **Services**, you can see the average latency, error rate, throughput and trace for each service in the list.