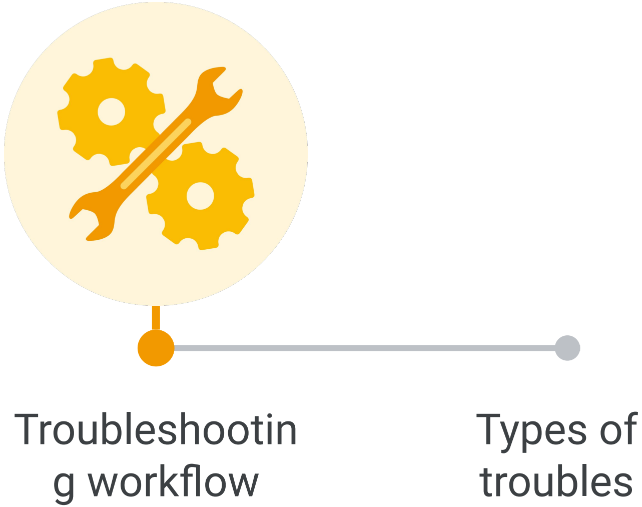
Troubleshooting & Debugging

Chirag Shankar

Systems Engineer, Google Cloud

Troubleshooting & Debug

Agenda



Troubleshooting workflow

Types of troubles

Troubleshooting Workflow

Troubleshootin
g workflow

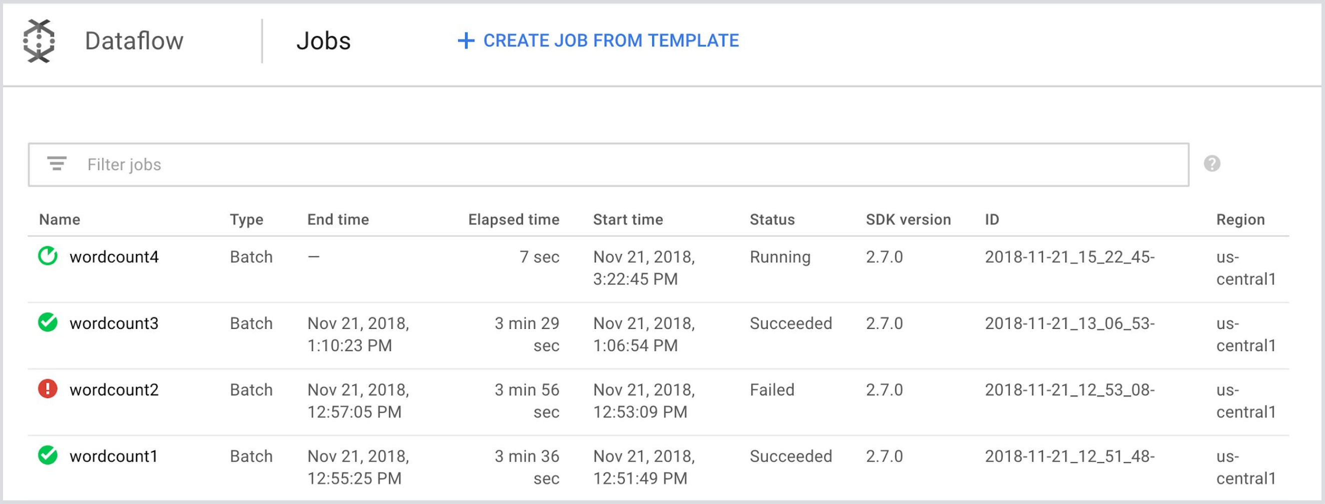
- Checking for errors
- Looking for anomalies in the Job metrics tab

Troubleshooting Workflow

Troubleshootin
g workflow

- Checking for errors
  - Logs
  - Execution Graph
- Looking for anomalies in the Job metrics tab

Checking for errors

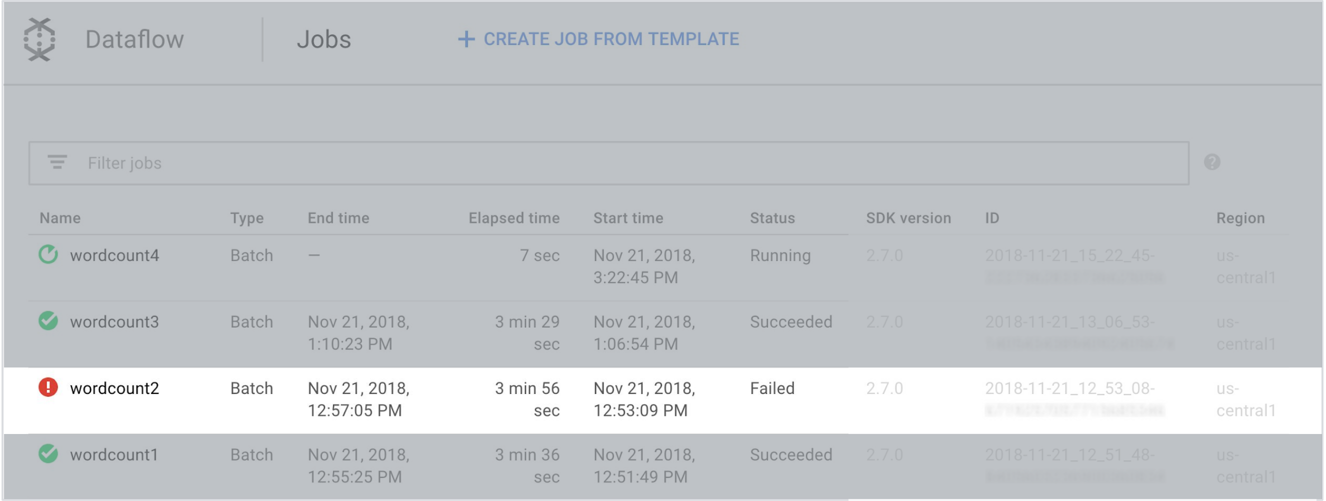


Dataflow | Jobs | + CREATE JOB FROM TEMPLATE

Filter jobs

Name	Type	End time	Elapsed time	Start time	Status	SDK version	ID	Region
wordcount4	Batch	–	7 sec	Nov 21, 2018, 3:22:45 PM	Running	2.7.0	2018-11-21_15_22_45-	us-central1
wordcount3	Batch	Nov 21, 2018, 1:10:23 PM	3 min 29 sec	Nov 21, 2018, 1:06:54 PM	Succeeded	2.7.0	2018-11-21_13_06_53-	us-central1
wordcount2	Batch	Nov 21, 2018, 12:57:05 PM	3 min 56 sec	Nov 21, 2018, 12:53:09 PM	Failed	2.7.0	2018-11-21_12_53_08-	us-central1
wordcount1	Batch	Nov 21, 2018, 12:55:25 PM	3 min 36 sec	Nov 21, 2018, 12:51:49 PM	Succeeded	2.7.0	2018-11-21_12_51_48-	us-central1

Checking for errors



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wordcount4	Batch	—	7 sec	Nov 21, 2018, 3:22:45 PM	Running	2.7.0	2018-11-21_15_22_45-[redacted]	us-central1
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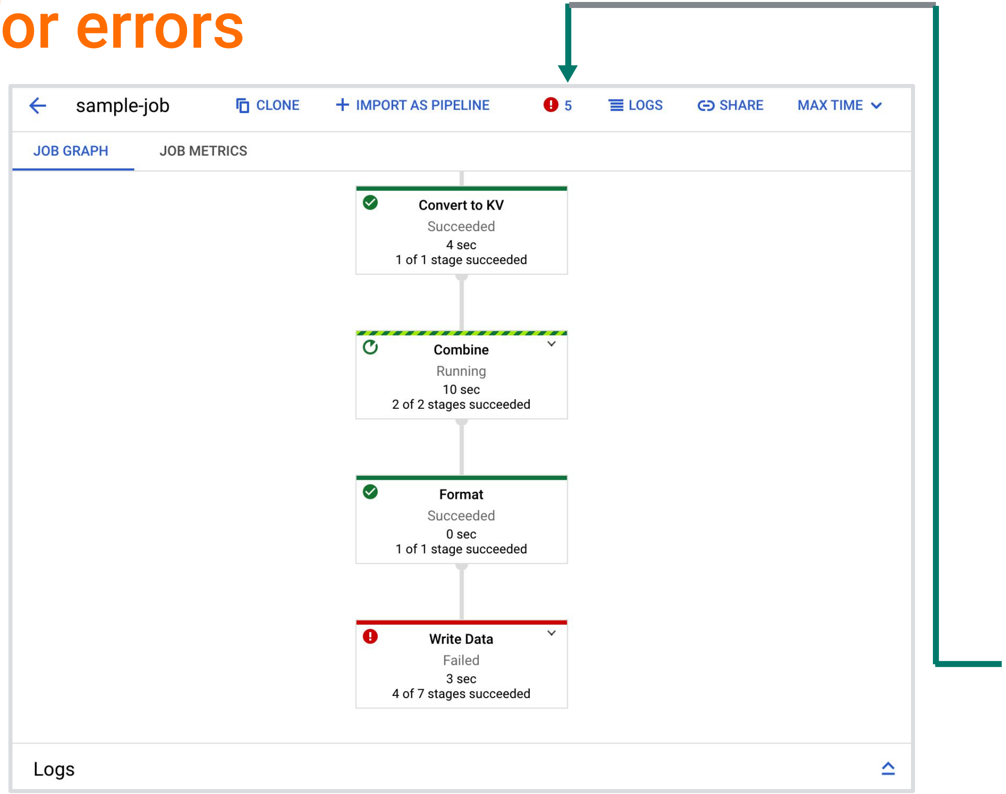
Checking for errors



sample-job

CLONE

IMPORT AS PIPELINE

5

LOGS

SHARE

MAX TIME

JOB GRAPH

JOB METRICS

Convert to KV
Succeeded
4 sec
1 of 1 stage succeeded

Combine
Running
10 sec
2 of 2 stages succeeded

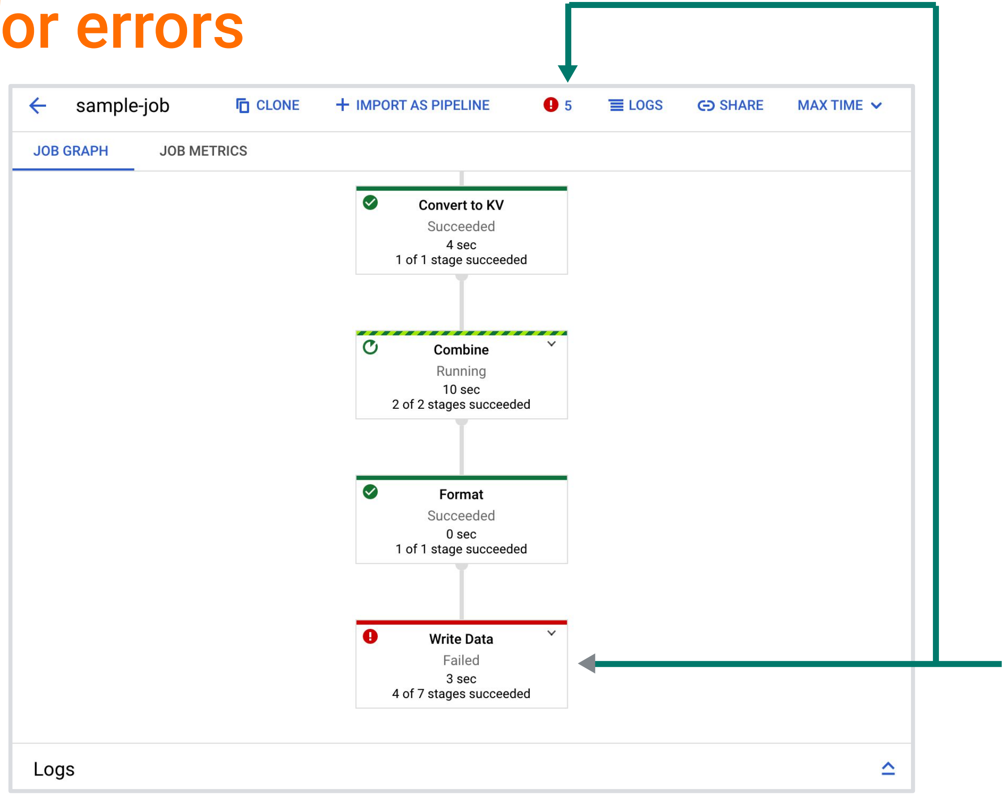
Format
Succeeded
0 sec
1 of 1 stage succeeded

Write Data
Failed
3 sec
4 of 7 stages succeeded

Logs

Checking
for errors

Checking for errors



Convert to KV
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Logs

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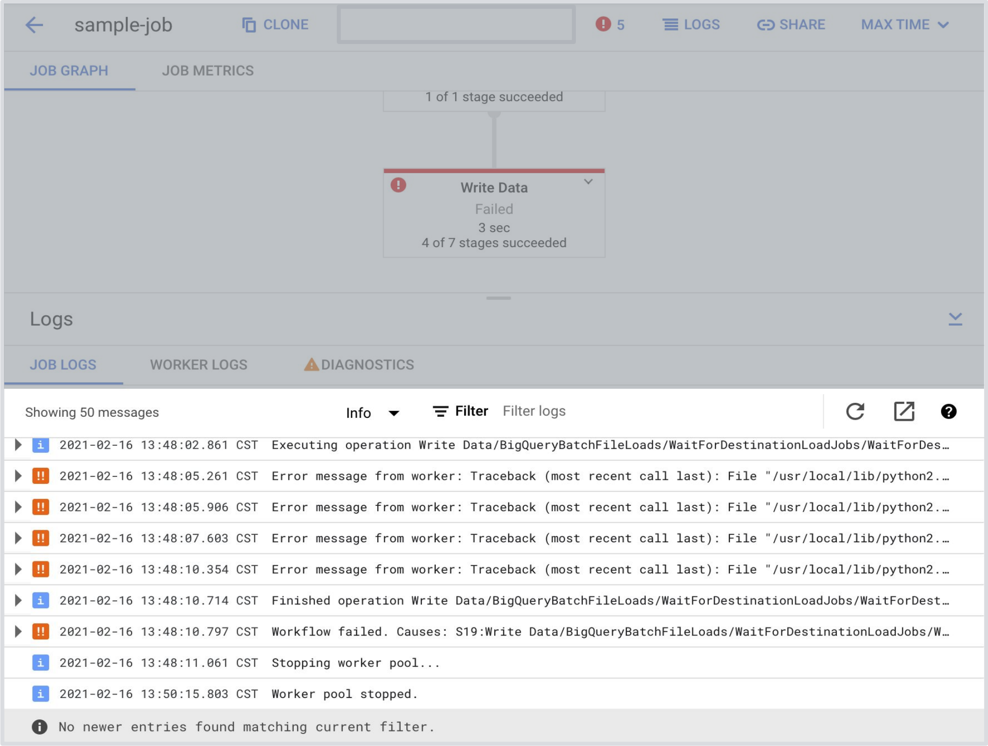
Checking for errors



```
2021-02-16 13:48:02.861 CST  Executing operation Write Data/BigQueryBatchFileLoads/WaitForDestinationLoadJobs/WaitForDes…
2021-02-16 13:48:05.261 CST  Error message from worker: Traceback (most recent call last): File "/usr/local/lib/python2.…
2021-02-16 13:48:05.906 CST  Error message from worker: Traceback (most recent call last): File "/usr/local/lib/python2.…
2021-02-16 13:48:07.603 CST  Error message from worker: Traceback (most recent call last): File "/usr/local/lib/python2.…
2021-02-16 13:48:10.354 CST  Error message from worker: Traceback (most recent call last): File "/usr/local/lib/python2.…
2021-02-16 13:48:10.714 CST  Finished operation Write Data/BigQueryBatchFileLoads/WaitForDestinationLoadJobs/WaitForDest…
2021-02-16 13:48:10.797 CST  Workflow failed. Causes: S19:Write Data/BigQueryBatchFileLoads/WaitForDestinationLoadJobs/W…
2021-02-16 13:48:11.061 CST  Stopping worker pool...
2021-02-16 13:50:15.803 CST  Worker pool stopped.
No newer entries found matching current filter.
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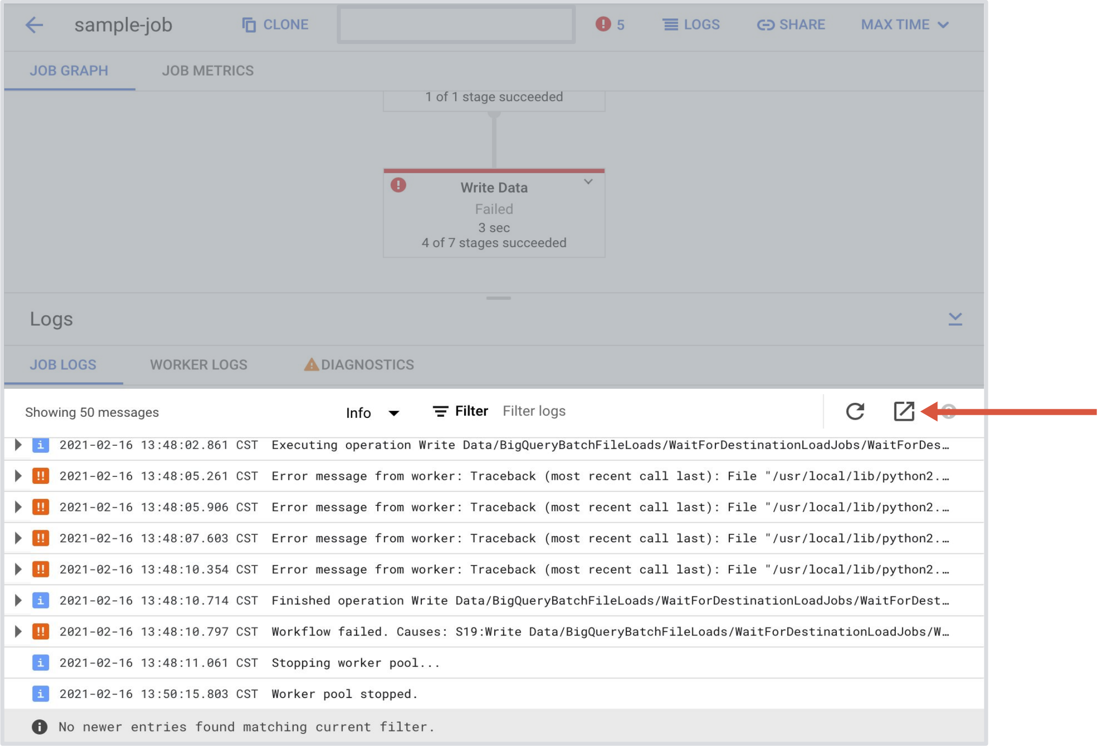

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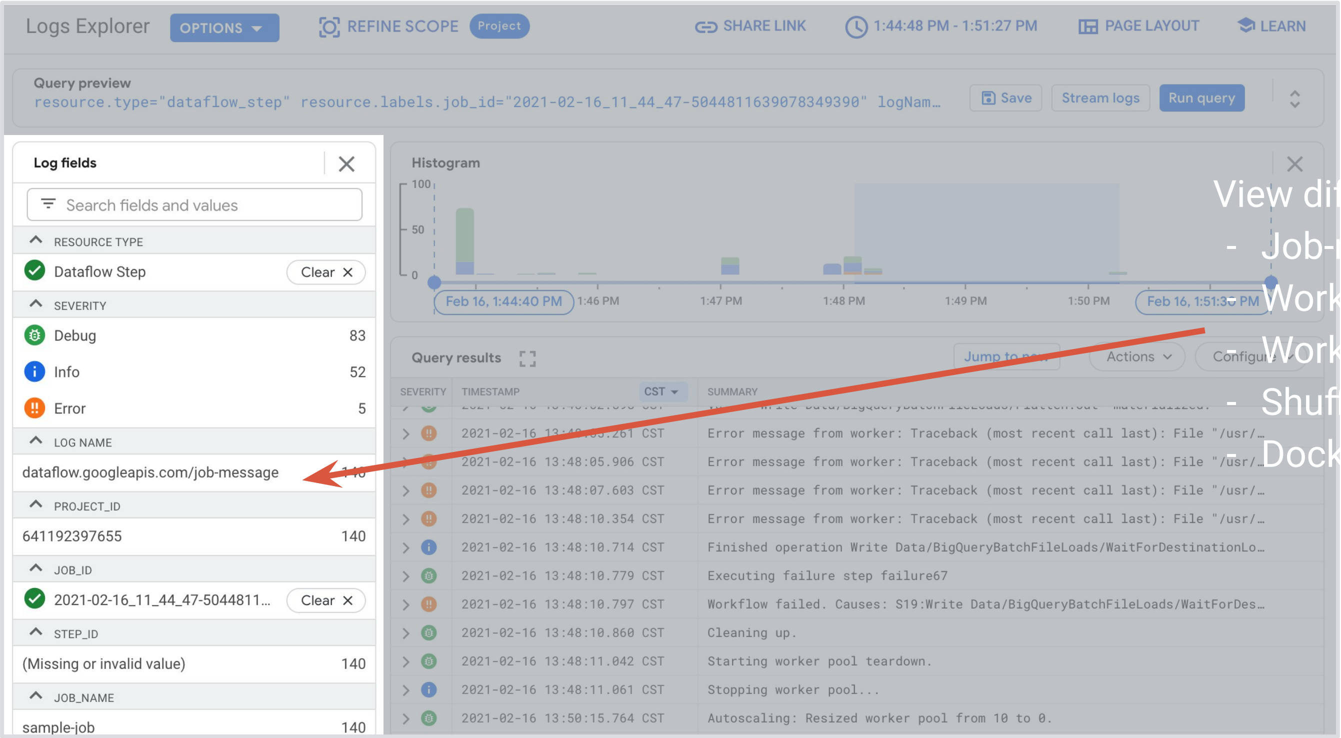
Checking for errors



Query preview

```
resource.type="dataflow_step" resource.labels.job_id="2021-02-16_11_44_47-5044811639078349390" logNam…
```

Log fields

Search fields and values

RESOURCE TYPE

- ✓ Dataflow Step — Clear ×

SEVERITY

Debug	83
Info	52
Error	5

LOG NAME

dataflow.googleapis.com/job-message	140

PROJECT_ID

641192397655	140

JOB_ID

- ✓ 2021-02-16_11_44_47-5044811… — Clear ×

STEP_ID

(Missing or invalid value)	140

JOB_NAME

sample-job	140

Query results

```
SEVERITY  TIMESTAMP                    CST  SUMMARY
   !!     2021-02-16 13:48:03.261 CST       Error message from worker: Traceback (most recent call last): File "/usr/…
   !!     2021-02-16 13:48:05.906 CST       Error message from worker: Traceback (most recent call last): File "/usr/…
   !!     2021-02-16 13:48:07.603 CST       Error message from worker: Traceback (most recent call last): File "/usr/…
   !!     2021-02-16 13:48:10.354 CST       Error message from worker: Traceback (most recent call last): File "/usr/…
   i      2021-02-16 13:48:10.714 CST       Finished operation Write Data/BigQueryBatchFileLoads/WaitForDestinationLo…
          2021-02-16 13:48:10.779 CST       Executing failure step failure67
   !!     2021-02-16 13:48:10.797 CST       Workflow failed. Causes: S19:Write Data/BigQueryBatchFileLoads/WaitForDes…
          2021-02-16 13:48:10.860 CST       Cleaning up.
          2021-02-16 13:48:11.042 CST       Starting worker pool teardown.
   i      2021-02-16 13:48:11.061 CST       Stopping worker pool...
          2021-02-16 13:50:15.764 CST       Autoscaling: Resized worker pool from 10 to 0.
```

View di

- Job-
- Work
- Work
- Shuf
- Dock

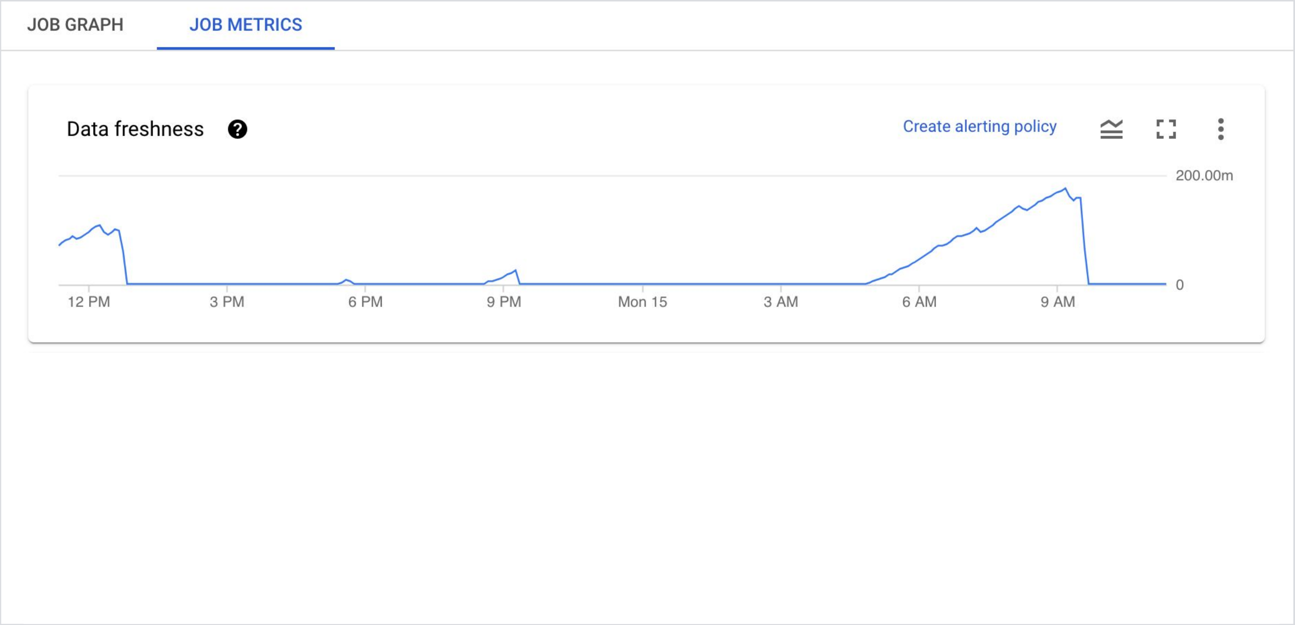
Troubleshooting Workflow

Troubleshooting workflow

- Checking for errors
- Looking for anomalies in the Job metrics tab

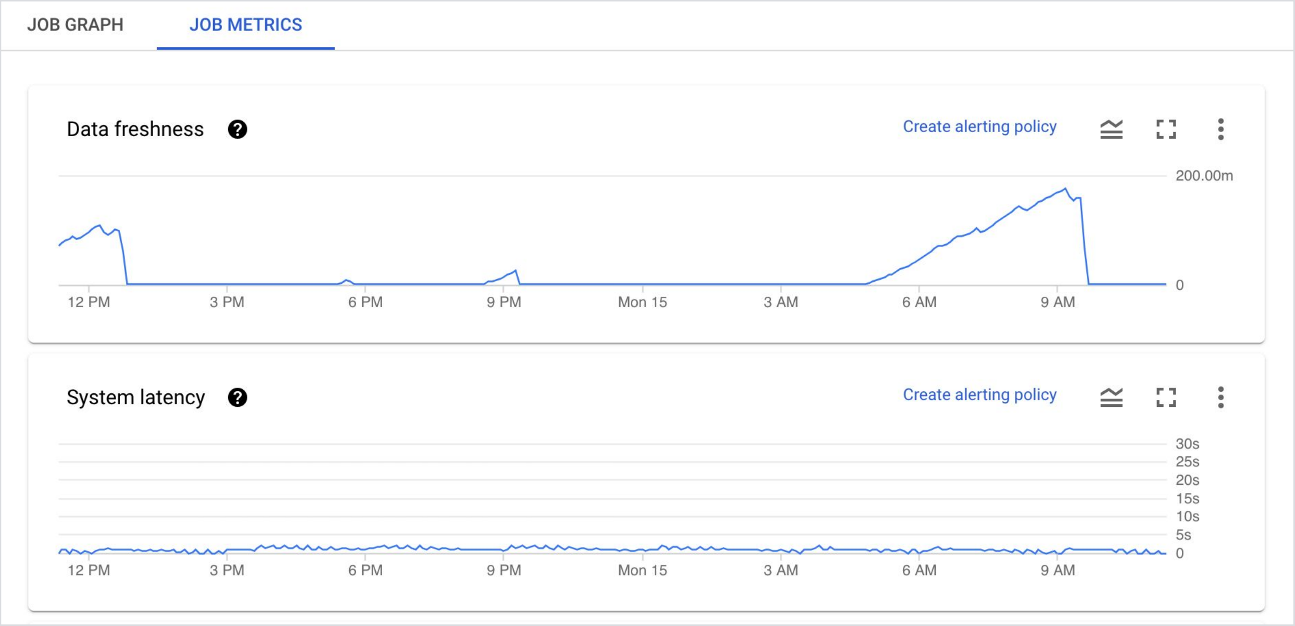
Looking for anomalies in the Job metrics tab

Streaming pipelines



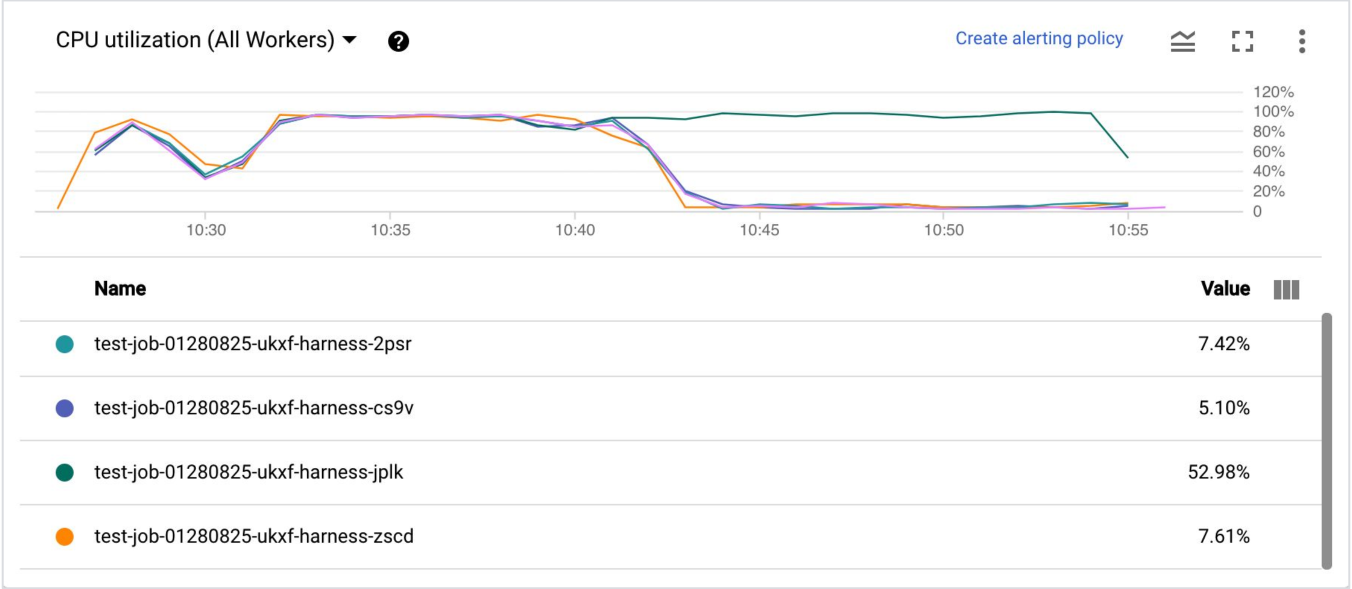
Looking for anomalies in the Job metrics tab

Streaming pipelines



Looking for anomalies in the Job metrics tab

All Dataflow Jobs



	Name	Value
●	test-job-01280825-ukxf-harness-2psr	7.42%
●	test-job-01280825-ukxf-harness-cs9v	5.10%
●	test-job-01280825-ukxf-harness-jplk	52.98%
●	test-job-01280825-ukxf-harness-zscd	7.61%

Troubleshooting & Debug

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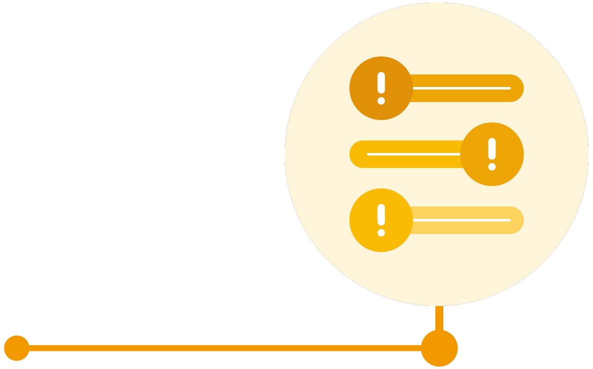

Troubleshooting workflow

Types of troubles

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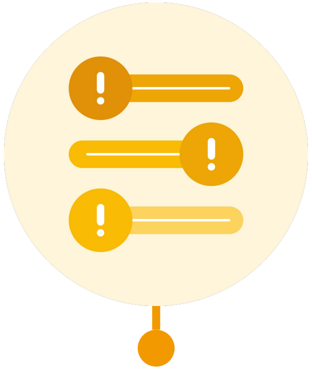

Types of troubles

- Failure building the pipeline
- Failure starting the pipeline on Dataflow
- Failure during pipeline execution
- Performance problems

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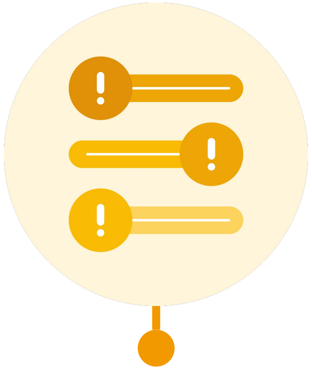

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Failure building the pipeline

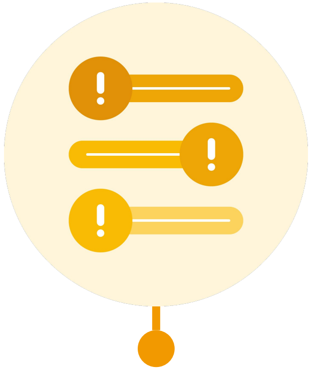
These errors occur when Apache Beam is building the pipeline:

- Validating "Beam Model" aspects of the pipeline
- Validating input/output specifications
- You can reproduce it with the direct runner, in a unit test

Failure building the pipeline

```
java.lang.IllegalStateException: GroupByKey cannot be applied to non-bounded
PCollection in the GlobalWindow without a trigger. Use a Window.into or
Window.triggering transform prior to GroupByKey.
    at org.apache.beam.sdk.transforms.GroupByKey.applicableTo (GroupByKey.java:153)
    at org.apache.beam.sdk.transforms.GroupByKey.expand (GroupByKey.java:185)
    at org.apache.beam.sdk.transforms.GroupByKey.expand (GroupByKey.java:107)
    at org.apache.beam.sdk.Pipeline.applyInternal (Pipeline.java:537)
    at org.apache.beam.sdk.Pipeline.applyTransform (Pipeline.java:471)
    at org.apache.beam.sdk.values.PCollection.apply (PCollection.java:357)
    at ...
```

Types of Troubles



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Failure starting the pipeline on Dataflow

Once the Dataflow service has received your pipeline's graph, the service will attempt to validate your job:

- Making sure the service can access your job's associated Cloud Storage buckets for file staging and temporary output.

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Failure starting the pipeline on Dataflow

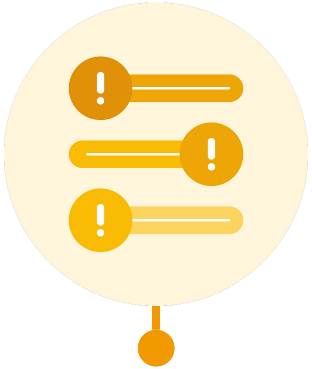
Once the Dataflow service has received your pipeline's graph, the service will attempt to validate your job:

- Making sure the service can access your job's associated Cloud Storage buckets for file staging and temporary output.
- Checking for the required permissions in your Google Cloud project.
- Making sure the service can access input and output sources, such as files.

Failure starting the pipeline on Dataflow

```
apitools.base.py.exceptions.HttpForbiddenError: HttpError accessing
<https://dataflow.googleapis.com/v1b3/projects/xyz/locations/us-central1/jobs?alt=json>:
response: <{'status': '403', 'content-length': '288', 'x-xss-protection': '0',
'x-content-type-options': 'nosniff', 'transfer-encoding': 'chunked', 'vary': 'Origin,
X-Origin, Referer', 'server': 'ESF', '-content-encoding': 'gzip', 'cache-control': 'private',
'date': 'Tue, 10 Dec 2019 17:56:00 GMT', 'x-frame-options': 'SAMEORIGIN', 'alt-svc':
'quic=":443"; ma=2592000; v="46,43",h3-Q050=":443"; ma=2592000,h3-Q049=":443";
ma=2592000,h3-Q048=":443"; ma=2592000,h3-Q046=":443"; ma=2592000,h3-Q043=":443"; ma=2592000',
'content-type': 'application/json; charset=UTF-8'}>, content <{
        "error": {
          "code": 403,
          "message": "(43abf11c2446750): Could not create workflow; user does not have write
      access to project: xyz Causes: (43abf11c244683b): Permission 'dataflow.jobs.create'
      denied on project: 'xyz'",
          "status": "PERMISSION_DENIED"
        }
      }
```

Types of Troubles



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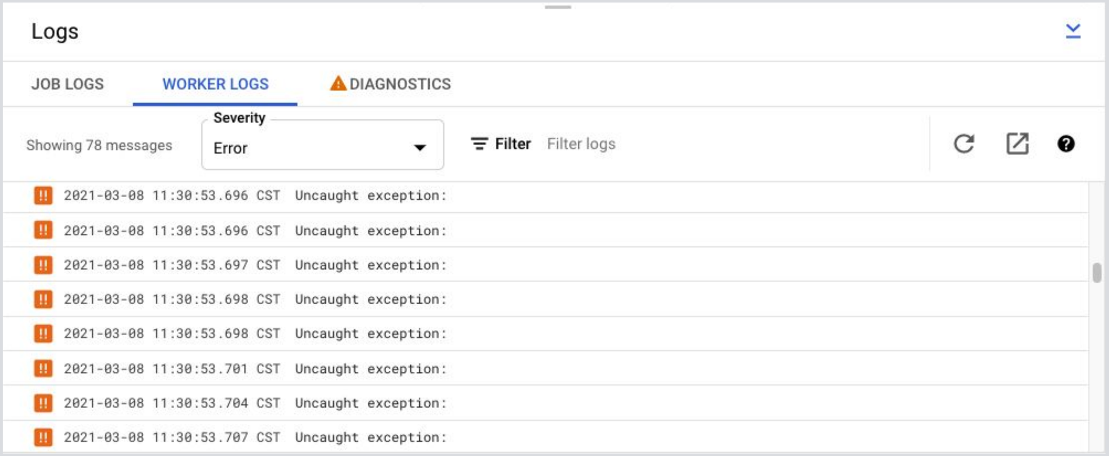
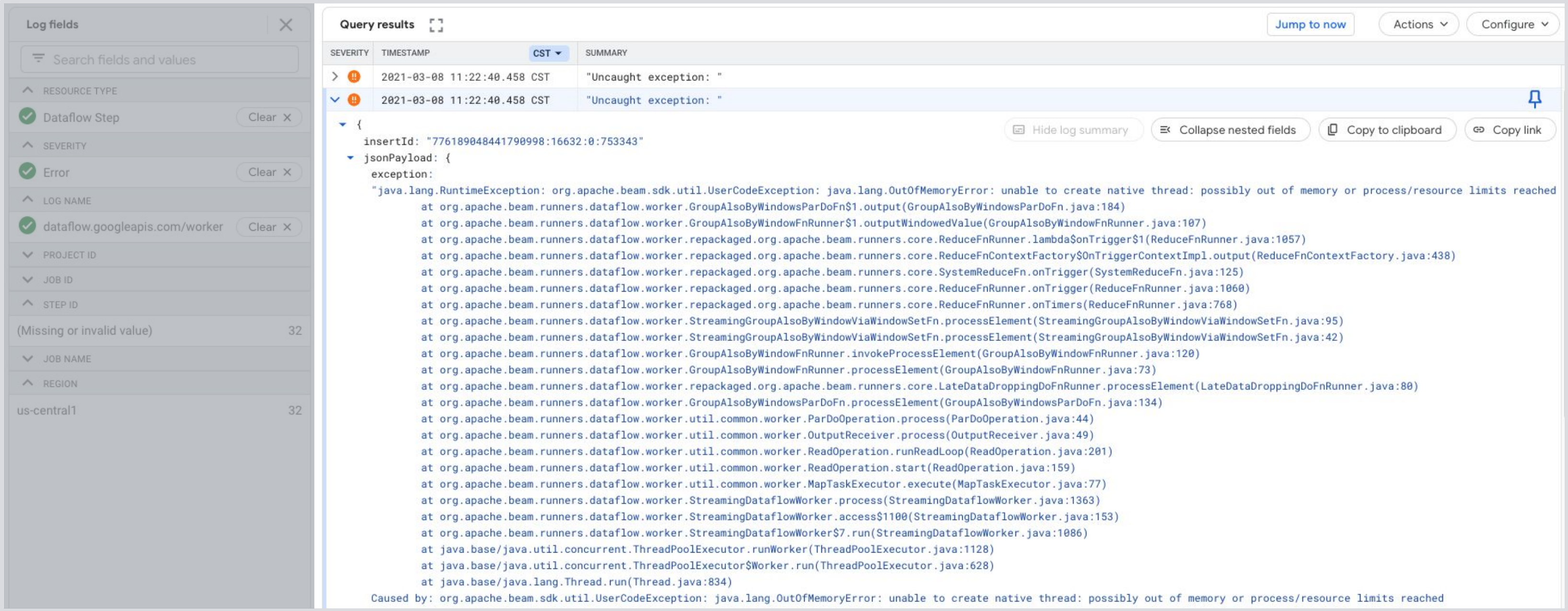


Showing 78 messages

Severity: Error

```
2021-03-08 11:30:53.696 CST  Uncaught exception:
2021-03-08 11:30:53.696 CST  Uncaught exception:
2021-03-08 11:30:53.697 CST  Uncaught exception:
2021-03-08 11:30:53.698 CST  Uncaught exception:
2021-03-08 11:30:53.698 CST  Uncaught exception:
2021-03-08 11:30:53.701 CST  Uncaught exception:
2021-03-08 11:30:53.704 CST  Uncaught exception:
2021-03-08 11:30:53.707 CST  Uncaught exception:
```

Failure during pipeline execution



```
2021-03-08 11:22:40.458 CST   "Uncaught exception: "
2021-03-08 11:22:40.458 CST   "Uncaught exception: "
{
  insertId: "776189048441790998:16632:0:753343"
  jsonPayload: {
   exception:
   "java.lang.RuntimeException: org.apache.beam.sdk.util.UserCodeException: java.lang.OutOfMemoryError: unable to create native thread: possibly out of memory or process/resource limits reached
         at org.apache.beam.runners.dataflow.worker.GroupAlsoByWindowsParDoFn$1.output(GroupAlsoByWindowsParDoFn.java:184)
         at org.apache.beam.runners.dataflow.worker.GroupAlsoByWindowFnRunner$1.outputWindowedValue(GroupAlsoByWindowFnRunner.java:107)
         at org.apache.beam.runners.dataflow.worker.repackaged.org.apache.beam.runners.core.ReduceFnRunner.lambda$onTrigger$1(ReduceFnRunner.java:1057)
         at org.apache.beam.runners.dataflow.worker.repackaged.org.apache.beam.runners.core.ReduceFnContextFactory$OnTriggerContextImpl.output(ReduceFnContextFactory.java:438)
         at org.apache.beam.runners.dataflow.worker.repackaged.org.apache.beam.runners.core.SystemReduceFn.onTrigger(SystemReduceFn.java:125)
         at org.apache.beam.runners.dataflow.worker.repackaged.org.apache.beam.runners.core.ReduceFnRunner.onTrigger(ReduceFnRunner.java:1060)
         at org.apache.beam.runners.dataflow.worker.repackaged.org.apache.beam.runners.core.ReduceFnRunner.onTimers(ReduceFnRunner.java:768)
         at org.apache.beam.runners.dataflow.worker.StreamingGroupAlsoByWindowViaWindowSetFn.processElement(StreamingGroupAlsoByWindowViaWindowSetFn.java:95)
         at org.apache.beam.runners.dataflow.worker.StreamingGroupAlsoByWindowViaWindowSetFn.processElement(StreamingGroupAlsoByWindowViaWindowSetFn.java:42)
         at org.apache.beam.runners.dataflow.worker.GroupAlsoByWindowFnRunner.invokeProcessElement(GroupAlsoByWindowFnRunner.java:120)
         at org.apache.beam.runners.dataflow.worker.GroupAlsoByWindowFnRunner.processElement(GroupAlsoByWindowFnRunner.java:73)
         at org.apache.beam.runners.dataflow.worker.repackaged.org.apache.beam.runners.core.LateDataDroppingDoFnRunner.processElement(LateDataDroppingDoFnRunner.java:80)
         at org.apache.beam.runners.dataflow.worker.GroupAlsoByWindowsParDoFn.processElement(GroupAlsoByWindowsParDoFn.java:134)
         at org.apache.beam.runners.dataflow.worker.util.common.worker.ParDoOperation.process(ParDoOperation.java:44)
         at org.apache.beam.runners.dataflow.worker.util.common.worker.OutputReceiver.process(OutputReceiver.java:49)
         at org.apache.beam.runners.dataflow.worker.util.common.worker.ReadOperation.runReadLoop(ReadOperation.java:201)
         at org.apache.beam.runners.dataflow.worker.util.common.worker.ReadOperation.start(ReadOperation.java:159)
         at org.apache.beam.runners.dataflow.worker.util.common.worker.MapTaskExecutor.execute(MapTaskExecutor.java:77)
         at org.apache.beam.runners.dataflow.worker.StreamingDataflowWorker.process(StreamingDataflowWorker.java:1363)
         at org.apache.beam.runners.dataflow.worker.StreamingDataflowWorker.access$1100(StreamingDataflowWorker.java:153)
         at org.apache.beam.runners.dataflow.worker.StreamingDataflowWorker$7.run(StreamingDataflowWorker.java:1086)
         at java.base/java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1128)
         at java.base/java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:628)
         at java.base/java.lang.Thread.run(Thread.java:834)
   Caused by: org.apache.beam.sdk.util.UserCodeException: java.lang.OutOfMemoryError: unable to create native thread: possibly out of memory or process/resource limits reached
```

Failure during pipeline execution

```
class FilterMessagesFn(beam.DoFn):
    BAD_MESSAGE_TAG = 'bad_message'
    GOOD_MESSAGE_TAG = 'good_message'

    def process(self, element, window=beam.DoFn.WindowParam):
        try:
            data = element.decode()
            # tag the elements accordingly
            if 'bad' in data:
                yield pvalue.TaggedOutput(self.BAD_MESSAGE_TAG, element)
            else:
                yield pvalue.TaggedOutput(self.GOOD_MESSAGE_TAG, element)

        # handle any exceptions in the processing
        except Exception as exp:
            logging.getLogger.warning(exp)
            yield pvalue.TaggedOutput(self.BAD_MESSAGE_TAG, element)
```

Failure during pipeline execution

To track failing elements:

- Log the failing elements and check the output using Cloud Logging.

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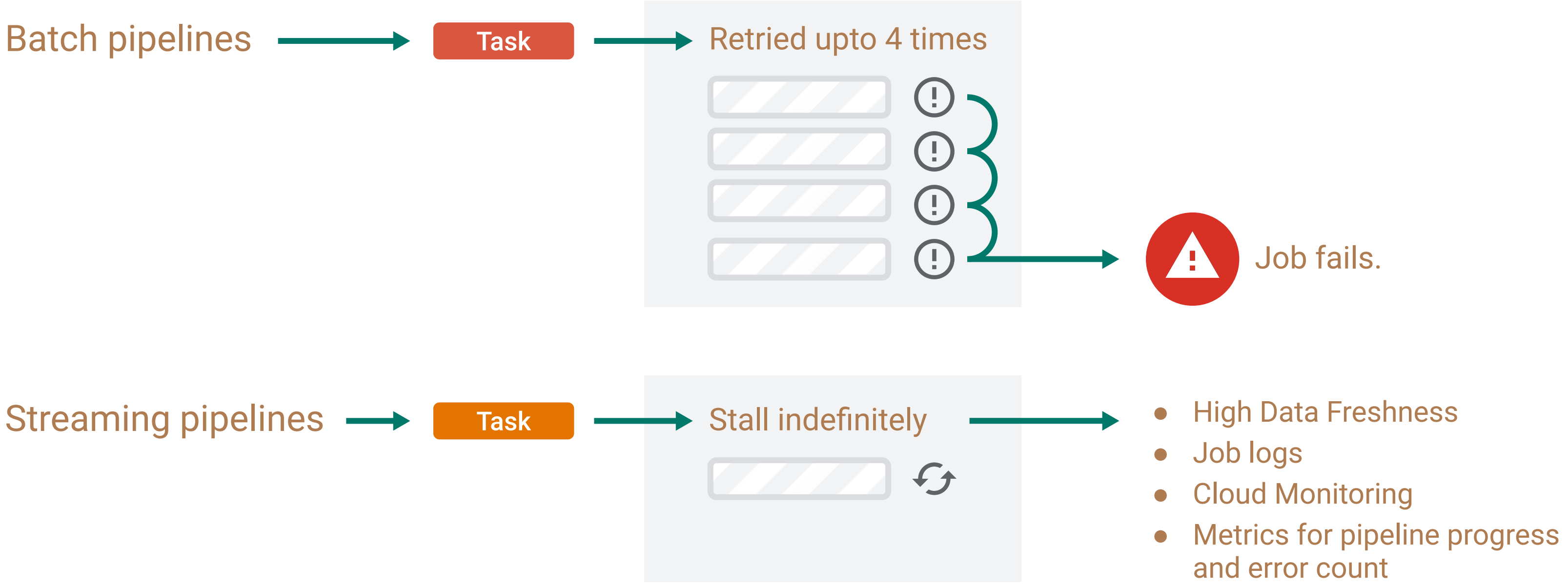
- Log the failing elements and check the output using Cloud Logging.
- Check the Dataflow worker and worker startup logs for warnings or errors by following the instructions in Viewing logs.
- Set your ParDo to write the failing elements to an additional output for later inspection.

Failure during pipeline execution

Batch vs Streaming



- High Data Freshness
- Job logs
- Cloud Monitoring
- Metrics for pipeline progress and error count

Types of Troubles

Types of troubles

- Failure building the pipeline
- Failure starting the pipeline on Dataflow
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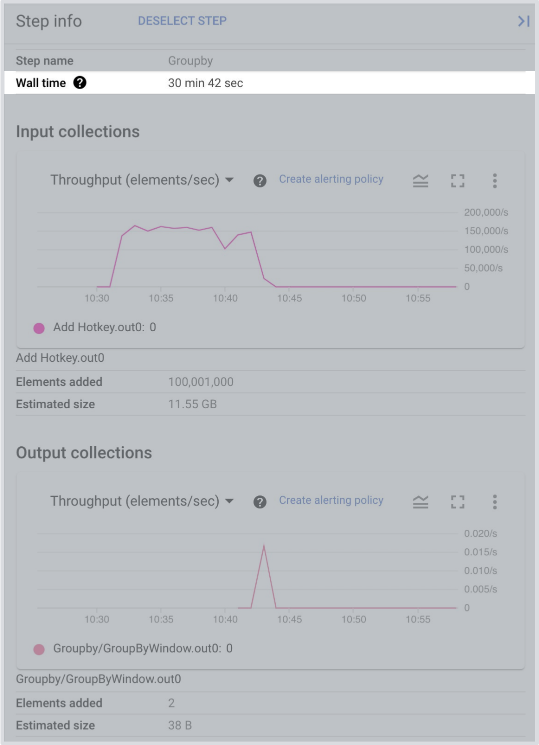
- Performance problems

Performance problems

Factors that can influence the performance of a pipeline:

- Pipeline design
- Data shape
- Interactions with sources, sinks and external systems

Performance problems



Step info DESELECT STEP

Step name	Groupby
Wall time	30 min 42 sec

Input collections

Add Hotkey.out0

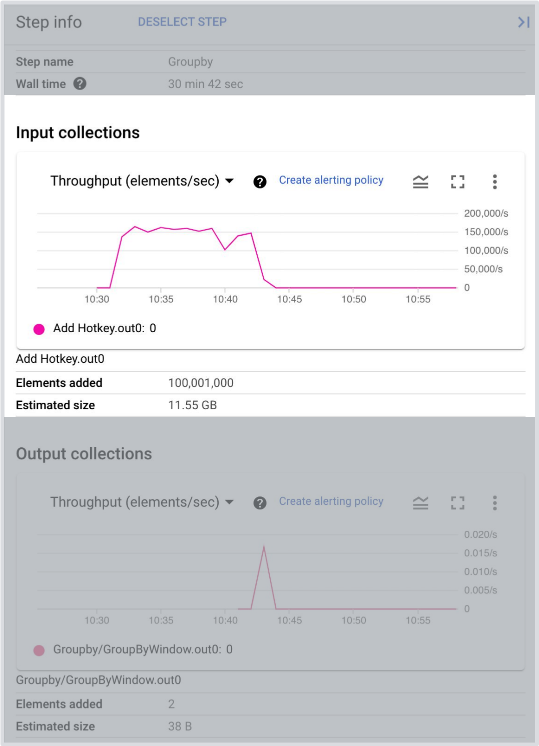
Elements added	100,001,000
Estimated size	11.55 GB

Output collections

Groupby/GroupByWindow.out0

Elements added	2
Estimated size	38 B

Performance problems



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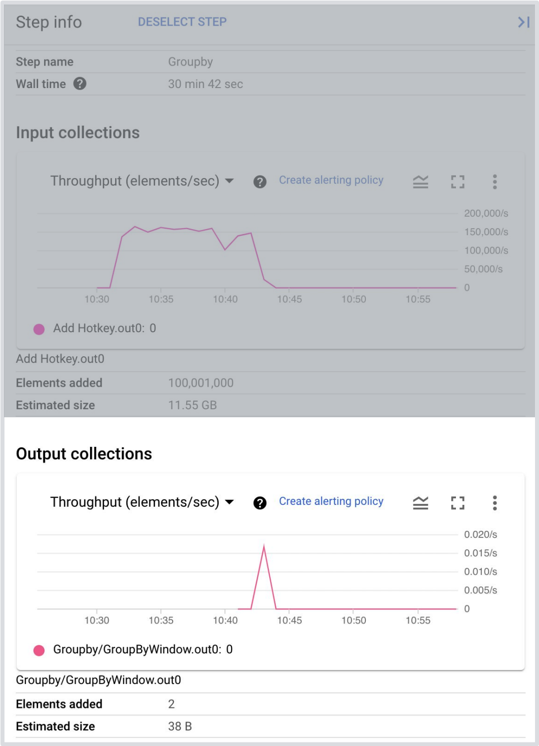

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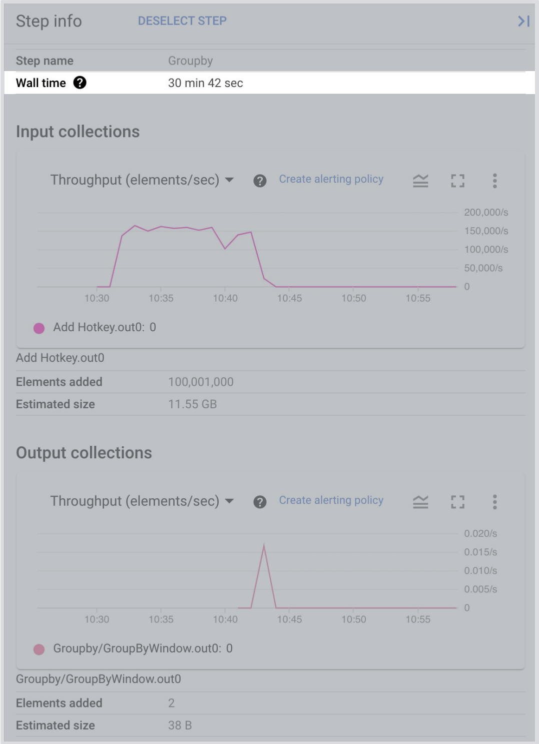


Step info DESELECT STEP

Step name	Groupby
Wall time ?	30 min 42 sec

Input collections

Add Hotkey.out0

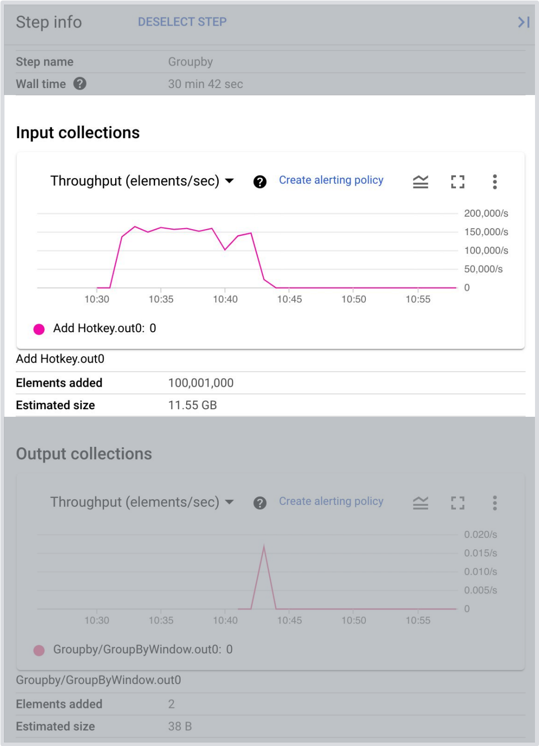
Elements added	100,001,000
Estimated size	11.55 GB

Output collections

Groupby/GroupByWindow.out0

Elements added	2
Estimated size	38 B

Performance problems



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Thank you!

Questions?