v**1. Connection & Service Errors**

### **1.1 BigQuery Service Unavailable**

**Error Message**

google.api\_core.exceptions.ServiceUnavailable: 503 The service is currently unavailable

**Cause:**

* Temporary downtime in the BigQuery service
* Network issues between Airflow and BigQuery
* Regional disruptions in Google Cloud

**Solution:**

* Check the [Google Cloud Status Dashboard](https://status.cloud.google.com/) for updates.
* If it’s a known Google Cloud issue, wait for service restoration.
* Confirm network connectivity from your environment to Google Cloud.

### **1.2 BigQuery API Not Enabled**

**Error Message**

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google.api\_core.exceptions.PermissionDenied: 403 BigQuery API has not been used in project [PROJECT\_ID]

**Cause:**

* The BigQuery API is not activated for the project.

**Solution:**

* Enable the BigQuery API in the Google Cloud Console.
* Allow up to 5 minutes for the activation to propagate across services.

## **2. Authentication & Permission Errors**

### **2.1 Invalid Service Account Configuration**

**Error Message**

makefile

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google.auth.exceptions.DefaultCredentialsError: Could not automatically determine credentials

**Cause:**

* Service account key file is missing or incorrectly configured.
* Environment variables are not set up for authentication.

**Solution:**

* Confirm that the service account key file exists and is correctly referenced.
* Check that the GOOGLE\_APPLICATION\_CREDENTIALS environment variable is set to the key file’s location.

### **2.2 Insufficient Permissions**

**Error Message**

arduino

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google.api\_core.exceptions.Forbidden: 403 Access Denied: Project [project-id]: User does not have bigquery.tables.get permission

**Cause:**

* The service account does not have the necessary BigQuery permissions.

**Solution:**

* Add the required roles (e.g., BigQuery Data Viewer) in the IAM settings of the Google Cloud Console.

## **3. Query Execution Errors**

### **3.1 Query Timeout**

**Error Message**

bash

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google.cloud.bigquery.job.QueryJobConfig: Query timeout after [X] seconds

**Cause:**

* The query is too complex or takes too long to complete.

**Solution:**

* Optimize your query by reducing data scanned or processing complexity.
* Consider increasing the timeout limit if appropriate.

### **3.2 Syntax Error**

**Error Message**

vbnet

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google.api\_core.exceptions.BadRequest: 400 Syntax error: Unexpected keyword SELECT at [1:1]

**Cause:**

* Syntax issues in the SQL query, such as typos or incompatible functions.

**Solution:**

* Double-check the SQL syntax and confirm that BigQuery functions are used correctly.

### **3.3 Resources Exceeded**

**Error Message**

graphql

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google.api\_core.exceptions.ResourceExhausted: Query exceeded resource limits

**Cause:**

* The query requires more resources than are available.

**Solution:**

* Simplify the query or reduce the data processed to avoid exhausting resources.

## **4. Airflow-Specific Errors**

### **4.1 Task Retry Limits Exceeded**

**Error Message**

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Airflow Task Retry Limit Exceeded: Task failed after [retries] attempts

**Cause:**

* The BigQuery task failed multiple times, and the retry limit in Airflow was reached.

**Solution:**

* Investigate the BigQuery error in the task logs.
* Increase the retry limit in Airflow if the error is intermittent.

### **4.2 BigQuery Connection Error in Airflow**

**Error Message**

javascript

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Airflow BigQuery Connection Error: Connection ID [gcp\_connection\_id] not found

**Cause:**

* The Airflow connection to BigQuery (via the GCP connection) is not set up correctly.

**Solution:**

* Verify that the correct GCP connection ID is used in Airflow.
* Ensure the GCP connection includes valid credentials and project information.

### **4.3 Missing Dataset Permissions**

**Error Message**

less

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google.api\_core.exceptions.Forbidden: Access Denied: Dataset [dataset\_id] not found

**Cause:**

* The Airflow service account lacks permission to access the specified dataset.

**Solution:**

* In the Google Cloud Console, grant the appropriate permissions on the dataset to the service account used by Airflow.

## **5. Data Loading & Export Errors**

### **5.1 Load Job Failure**

**Error Message**

vbnet

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google.cloud.exceptions.BadRequest: Error while reading data, error message: CSV parsing error

**Cause:**

* The data file does not match the expected format (e.g., schema mismatch).

**Solution:**

* Verify the file format and data consistency with BigQuery’s expected schema.

## **6. Schema & Data Type Errors**

### **6.1 Schema Mismatch**

**Error Message**

python

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google.api\_core.exceptions.BadRequest: Schema mismatch: Column [X] is declared as type STRING but has value of type INT64

**Cause:**

* The data format does not match the table schema.

**Solution:**

* Adjust the data format or table schema to match each other.

## **7. Quota & Limit Errors**

### **7.1 Concurrent Query Limit**

**Error Message**

rust

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google.api\_core.exceptions.ResourceExhausted: Quota exceeded for quota metric 'Concurrent queries'

**Cause:**

* Too many queries are running simultaneously.

**Solution:**

* Optimize query scheduling to avoid resource contention or increase quota limits.

## **8. Additional Notes for Troubleshooting**

1. **Airflow Logs**: Check Airflow task logs for more details on errors.
2. **Retry Configuration**: Set retries for transient errors, like service unavailability or resource contention.
3. **Google Cloud Console**: Access the Google Cloud Console for detailed error logs under the BigQuery Jobs section.