Lab 14: Loading JSON data into Snowflake

Have you ever faced any use case or scenario where you've to ***load JSON data into*** the **Snowflake**? We better know JSON data is one of the common data format to store and exchange information between systems. JSON is a relatively concise format. If we are implementing a database solution, it is very common that we will come across a system that provides data in JSON format. Snowflake has a very straight forward approach to load JSON data. In this blog, we will understand this approach in a step-wise manner.

1. Stage the JSON data

The JSON data looks like:

```
{
  "Name": "Aman Gupta",
  "family_detail": [
    {
      "Name": "Avinash Gupta",
      "Relationship": "Father",
    },
    {
      "Name": "Lata Gupta",
      "Relationship": "Mother",
    },
    {
      "Name": "Shrishti Gupta",
      "Relationship": "Sister",
    },
    {
      "Name": "Bobin Gupta",
      "Relationship": "Brother",
    }
  ]
}
```

Create `family.json` file with above content and save it. Also, update file path in below command.

In snowflake Staging the data means, make the data available in Snowflake ***stage***(intermediate storage) it can be **internal or external**. Staging JSON data in Snowflake is similar to staging any other files. Let's Staging JSON data file from a **local file system.**

```
CREATE OR REPLACE STAGE my_json_stage file_format = (type = json);
PUT file:///home/knoldus/Desktop/family.json @my_json_stage;
```

```
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>CREATE OR REPLACE STAGE my_json_stage file_format = (type = json);
+----------------------------------------------+
| status                                       |
|----------------------------------------------|
| Stage area MY_JSON_STAGE successfully created. |
+----------------------------------------------+
1 Row(s) produced. Time Elapsed: 0.236s
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>PUT file:///home/knoldus/Desktop/family.json @my_json_stage;
family.json_c.gz(0.00MB): [##########] 100.00% Done (0.297s, 0.00MB/s).
+-------------+---------------+-------------+-------------+--------------------+--------------------+----------+---------+
| source      | target        | source_size | target_size | source_compression | target_compression | status   | message |
|-------------+---------------+-------------+-------------+--------------------+--------------------+----------+---------|
| family.json | family.json.gz |         353 |         166 | NONE               | GZIP               | UPLOADED |         |
+-------------+---------------+-------------+-------------+--------------------+--------------------+----------+---------+
```

2. Load JSON data as raw into temporary table

To load the JSON data as raw, first, create a table with a column of VARIANT type. VARIANT can contain any type of data so it is suitable for loading JSON data.

```
CREATE TABLE relations_json_raw (
  json_data_raw VARIANT
);
```

Now let's **copy** the JSON file into **relations_json_raw** table.

```
COPY INTO relations_json_raw from @my_json_stage;
```

Note that a file format does not need to be specified because it is included in the stage definition.

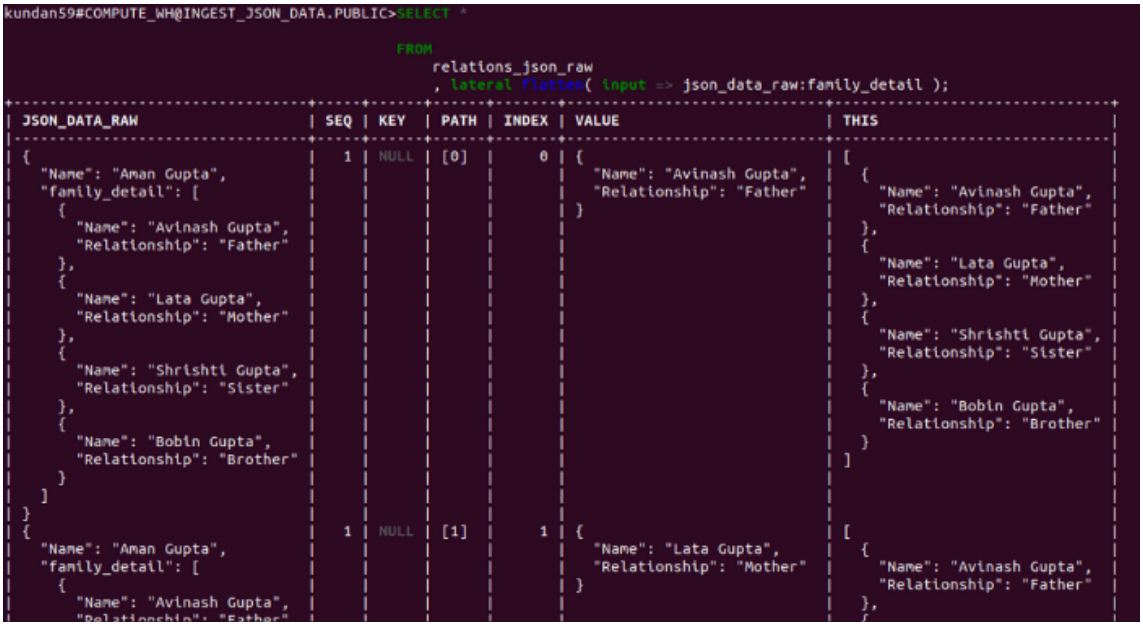
```
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>COPY INTO relations_json_raw from @my_json_stage;
+-----------------------------+--------+-------------+-------------+-------------+-------------+-------------+------------------+--------------+----------------------+
| file                        | status | rows_parsed | rows_loaded | error_limit | errors_seen | first_error | first_error_line | first_error_character | first_error_column_name |
|-----------------------------+--------+-------------+-------------+-------------+-------------+-------------+------------------+--------------+----------------------|
| my_json_stage/family.json.gz | LOADED |           1 |           1 |           1 |           0 | NULL        |             NULL |         NULL | NULL                 |
+-----------------------------+--------+-------------+-------------+-------------+-------------+-------------+------------------+--------------+----------------------+
```

3. Analyze and prepare raw JSON data

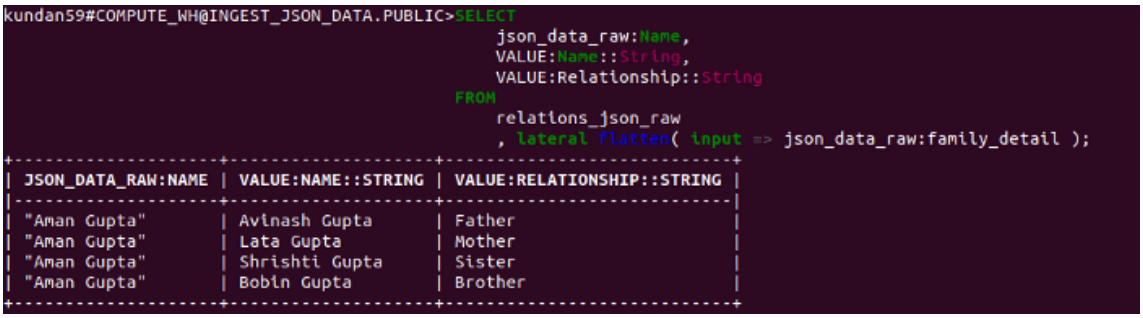
The next step would be **to analyze** the **loaded raw JSON data**. Determining what information needs to be extracted from JSON data. For example, in our case, we are interested to extract the name key and from the family_detail array object, we want to extract the name and relationship key from each JSON object. The below query will do that.

```
SELECT
    json_data_raw:Name,
    VALUE:Name::String,
    VALUE:Relationship::String
FROM
    relations_json_raw
    , lateral flatten( input => json_data_raw:family_detail );
```

The above query using **lateral join** and a **flatten functio**n. The flatten function returns a row for each JSON object from the family_detail array. and the lateral modifier joins the data with any information outside of the object, in our example candidate name that we are extracting with **json_data_raw: Name.**



```
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>SELECT *
                                        FROM
                                            relations_json_raw
                                            , lateral flatten( input => json_data_raw:family_detail );
+--------------------------------+-----+------+------+-------+-----------------------------+-----------------------------+
| JSON_DATA_RAW                  | SEQ | KEY  | PATH | INDEX | VALUE                       | THIS                        |
|--------------------------------+-----+------+------+-------+-----------------------------+-----------------------------|
| {                              |   1 | NULL | [0]  |     0 | {                           | [                           |
|   "Name": "Aman Gupta",        |     |      |      |       |   "Name": "Avinash Gupta",  |   {                         |
|   "family_detail": [           |     |      |      |       |   "Relationship": "Father"  |     "Name": "Avinash Gupta",|
|     {                          |     |      |      |       | }                           |     "Relationship": "Father"|
|       "Name": "Avinash Gupta", |     |      |      |       |                             |   },                        |
|       "Relationship": "Father" |     |      |      |       |                             |   {                         |
|     },                         |     |      |      |       |                             |     "Name": "Lata Gupta",   |
|     {                          |     |      |      |       |                             |     "Relationship": "Mother"|
|       "Name": "Lata Gupta",    |     |      |      |       |                             |   },                        |
|       "Relationship": "Mother" |     |      |      |       |                             |   {                         |
|     },                         |     |      |      |       |                             |     "Name": "Shrishti Gupta",|
|     {                          |     |      |      |       |                             |     "Relationship": "Sister"|
|       "Name": "Shrishti Gupta",|     |      |      |       |                             |   },                        |
|       "Relationship": "Sister" |     |      |      |       |                             |   {                         |
|     },                         |     |      |      |       |                             |     "Name": "Bobin Gupta",  |
|     {                          |     |      |      |       |                             |     "Relationship": "Brother"|
|       "Name": "Bobin Gupta",   |     |      |      |       |                             |   }                         |
|       "Relationship": "Brother"|     |      |      |       |                             | ]                           |
|     }                          |     |      |      |       |                             |                             |
|   ]                            |     |      |      |       |                             |                             |
| }                              |     |      |      |       |                             |                             |
| {                              |   1 | NULL | [1]  |     1 | {                           | [                           |
|   "Name": "Aman Gupta",        |     |      |      |       |   "Name": "Lata Gupta",     |   {                         |
|   "family_detail": [           |     |      |      |       |   "Relationship": "Mother"  |     "Name": "Avinash Gupta",|
|     {                          |     |      |      |       | }                           |     "Relationship": "Father"|
|       "Name": "Avinash Gupta", |     |      |      |       |                             |   },                        |
|       "Relationship": "Father" |     |      |      |       |                             |   {                         |
+--------------------------------+-----+------+------+-------+-----------------------------+-----------------------------+
```



```
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>SELECT
                                            json_data_raw:Name,
                                            VALUE:Name::String,
                                            VALUE:Relationship::String
                                        FROM
                                            relations_json_raw
                                            , lateral flatten( input => json_data_raw:family_detail );
+--------------------+--------------------+---------------------------+
| JSON_DATA_RAW:NAME | VALUE:NAME::STRING | VALUE:RELATIONSHIP::STRING |
|--------------------+--------------------+---------------------------|
| "Aman Gupta"       | Avinash Gupta      | Father                    |
| "Aman Gupta"       | Lata Gupta         | Mother                    |
| "Aman Gupta"       | Shrishti Gupta     | Sister                    |
| "Aman Gupta"       | Bobin Gupta        | Brother                   |
+--------------------+--------------------+---------------------------+
```

Load Data into target table

Now we have analyzed and extracted information. We can load the extracted data into the target table.

```
CREATE OR REPLACE TABLE candidate_family_detail AS
SELECT
    json_data_raw:Name AS candidate_name,
    VALUE:Name::String AS relation_name,
    VALUE:Relationship::String AS relationship

FROM
    relations_json_raw
    , lateral flatten( input => json_data_raw:family_detail );
```

```
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>CREATE OR REPLACE TABLE candidate_family_detail AS
                                            SELECT
                                                json_data_raw:Name AS candidate_name,
                                                VALUE:Name::String AS relation_name,
                                                VALUE:Relationship::String AS relationship
                                            FROM
                                                relations_json_raw
                                                , lateral flatten( input => json_data_raw:family_detail);
+-------------------------------------------------+
| status                                          |
|-------------------------------------------------|
| Table CANDIDATE_FAMILY_DETAIL successfully created. |
+-------------------------------------------------+
1 Row(s) produced. Time Elapsed: 1.798s
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>SELECT * from CANDIDATE_FAMILY_DETAIL;
+---------------+---------------+--------------+
| CANDIDATE_NAME | RELATION_NAME  | RELATIONSHIP |
|---------------+---------------+--------------|
| "Aman Gupta"   | Avinash Gupta  | Father       |
| "Aman Gupta"   | Lata Gupta     | Mother       |
| "Aman Gupta"   | Shrishti Gupta | Sister       |
| "Aman Gupta"   | Bobin Gupta    | Brother      |
+---------------+---------------+--------------+
```

If you don't want to do a "create table as", you can pre-create a table and then insert the JSON data into the table.

```
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>CREATE TABLE candidate_family_detail (
                                                candidate_name STRING,
                                                relation_name   STRING,
                                                relationship STRING
                                            );
+-------------------------------------------------+
| status                                          |
|-------------------------------------------------|
| Table CANDIDATE_FAMILY_DETAIL successfully created. |
+-------------------------------------------------+
1 Row(s) produced. Time Elapsed: 0.408s
```

```
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>INSERT INTO candidate_family_detail
                                            SELECT
                                                json_data_raw:Name AS candidate_name,
                                                VALUE:Name::String AS relation_name,
                                                VALUE:Relationship::String AS relationship

                                            FROM
                                                relations_json_raw
                                                , lateral flatten( input => json_data_raw:family_detail );
+------------------------+
| number of rows inserted |
|------------------------|
|                      4 |
+------------------------+
4 Row(s) produced. Time Elapsed: 2.193s
kundan59#COMPUTE_WH@INGEST_JSON_DATA.PUBLIC>SELECT * FROM candidate_family_detail;
+---------------+---------------+--------------+
| CANDIDATE_NAME | RELATION_NAME  | RELATIONSHIP |
|---------------+---------------+--------------|
| Aman Gupta     | Avinash Gupta  | Father       |
| Aman Gupta     | Lata Gupta     | Mother       |
| Aman Gupta     | Shrishti Gupta | Sister       |
| Aman Gupta     | Bobin Gupta    | Brother      |
+---------------+---------------+--------------+
4 Row(s) produced. Time Elapsed: 1.244s
```