

Hotel Bookings Analytics Solution

*End-to-End Snowflake Hotel Booking Analytics Project Using Medallion
Architecture*

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Contents

Executive Summary

Business Requirements - Hotel Analytics

- Background

- Objectives

- Functional Requirements

- Deliverables

Solution Architecture Overview

Data Warehouse & Processing Design

- Bronze Layer – Raw Data Ingestion

- Silver Layer – Cleansed & Transformed Data

- Gold Layer – Business Ready Data

Dashboard & Reporting– Hotel Bookings Analytics

Summary of Findings

Executive Summary

High-Level Overview of the Project

This project focused on developing an end-to-end Hotel Booking Analytics solution using Snowflake and SnowSight to transform raw hotel booking data into meaningful business insights. The solution leveraged the Medallion Architecture approach (Bronze, Silver, and Gold layers) to ingest, cleanse, standardize, and model hotel booking data for reporting and analytics purposes. The final dashboard provided stakeholders with interactive visualizations and KPI monitoring to support operational and strategic decision-making.

Business Problem Being Solved

The hotel organization faced challenges with inconsistent and unstructured booking data, limiting its ability to accurately monitor business performance. Management lacked visibility into key operational metrics such as monthly revenue trends, booking activity, customer booking behavior, and city-level revenue performance. Manual reporting processes and poor data quality reduced confidence in reporting accuracy and delayed decision-making.

Expected Business Value

The implementation of a centralized analytics solution provides management with accurate, timely, and business-ready reporting capabilities. By improving data quality and automating analytical reporting, the organization gains:

- Increased visibility into hotel performance trends
- Faster and more informed decision-making
- Improved operational reporting accuracy
- Better understanding of revenue-driving locations and booking patterns
- Reduced time spent on manual data preparation and reporting

The solution also establishes a scalable cloud-based analytics framework that can support future reporting enhancements and additional business intelligence initiatives.

Business Requirements - Hotel Analytics

Background

The hotel has raw, inconsistent booking data and lacks clear view of monthly revenue, booking trends, and city-level performance. Management needs quick, accurate insights for decision-making.

Objectives

- Clean and standardize booking data
- Show monthly revenue and monthly bookings
- Identify top revenue-generating cities
- Analyze bookings by type and status
- Display key KPIs (like total revenue, total bookings)

Functional Requirements

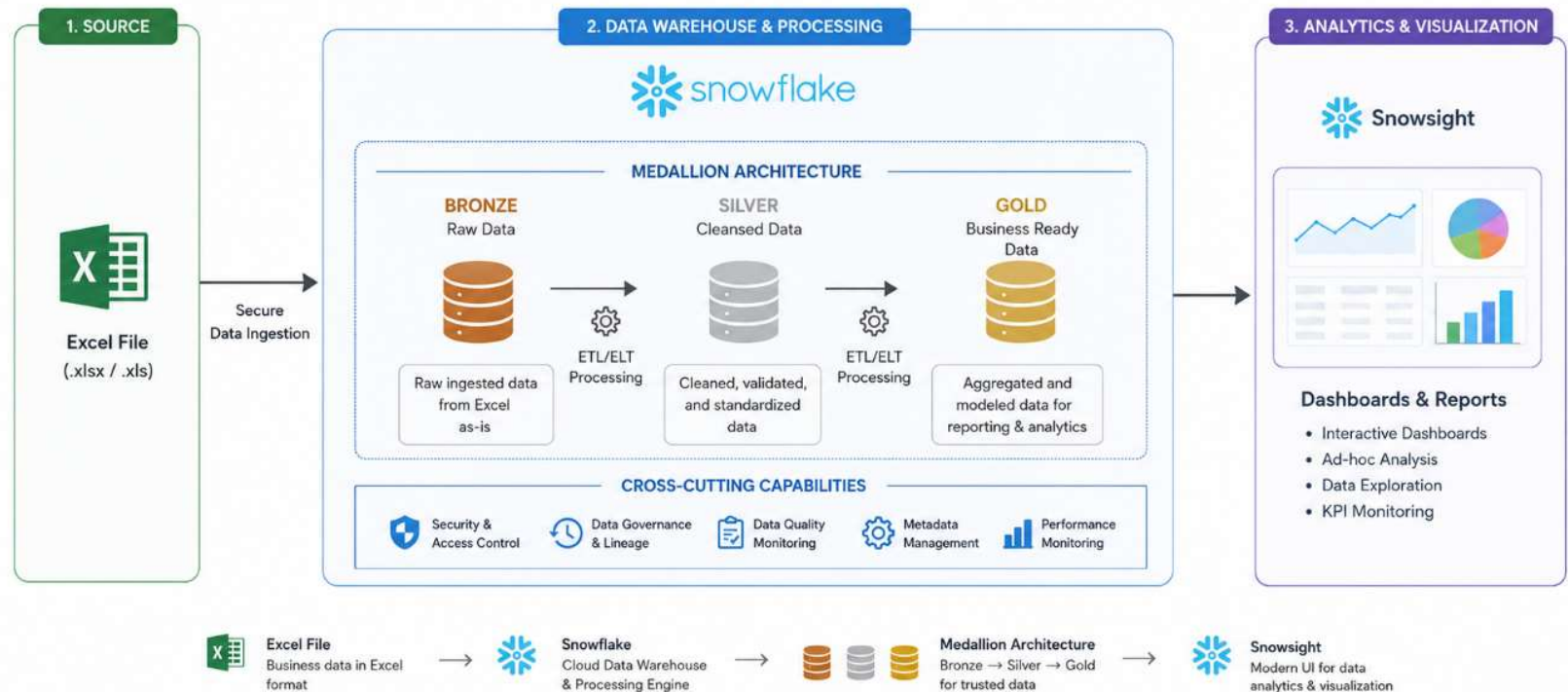
- Clean raw dataset (fix dates, duplicates, missing values)
- Transform data to monthly aggregates
- Build visuals:
 - Revenue per month (line chart)
 - Bookings per month (line chart)
 - Top cities by revenue (bar chart)
 - Bookings by type (bar chart)
 - Bookings by status (bar chart)
 - Expose KPIs on dashboard

Deliverables

- Accurate monthly metrics
- Correct KPIs
- Dashboard easy to interpret
- No data quality issues in final output

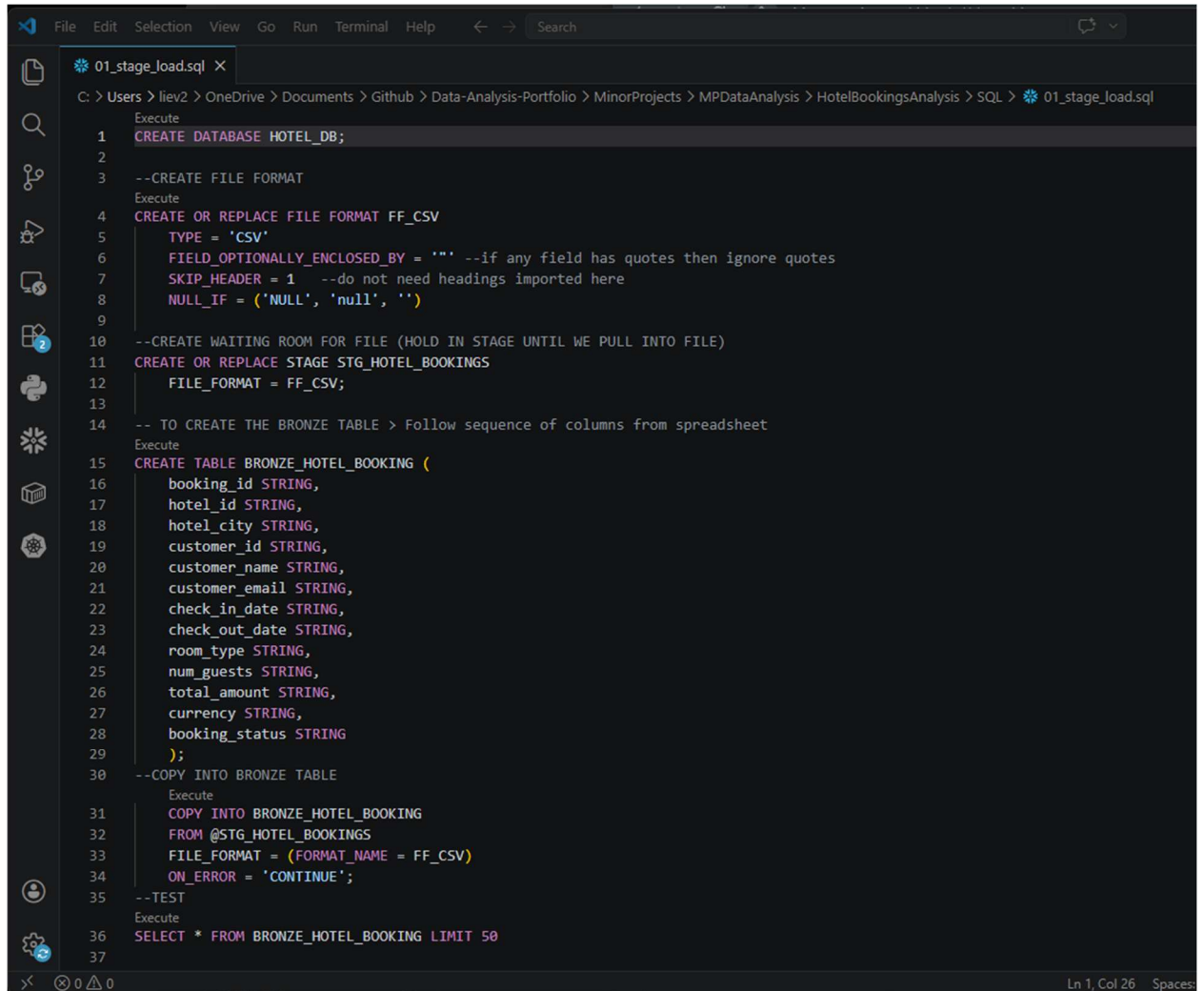
Solution Architecture Overview

Data Architecture – Excel to Snowflake Medallion Architecture with SnowSight Dashboard



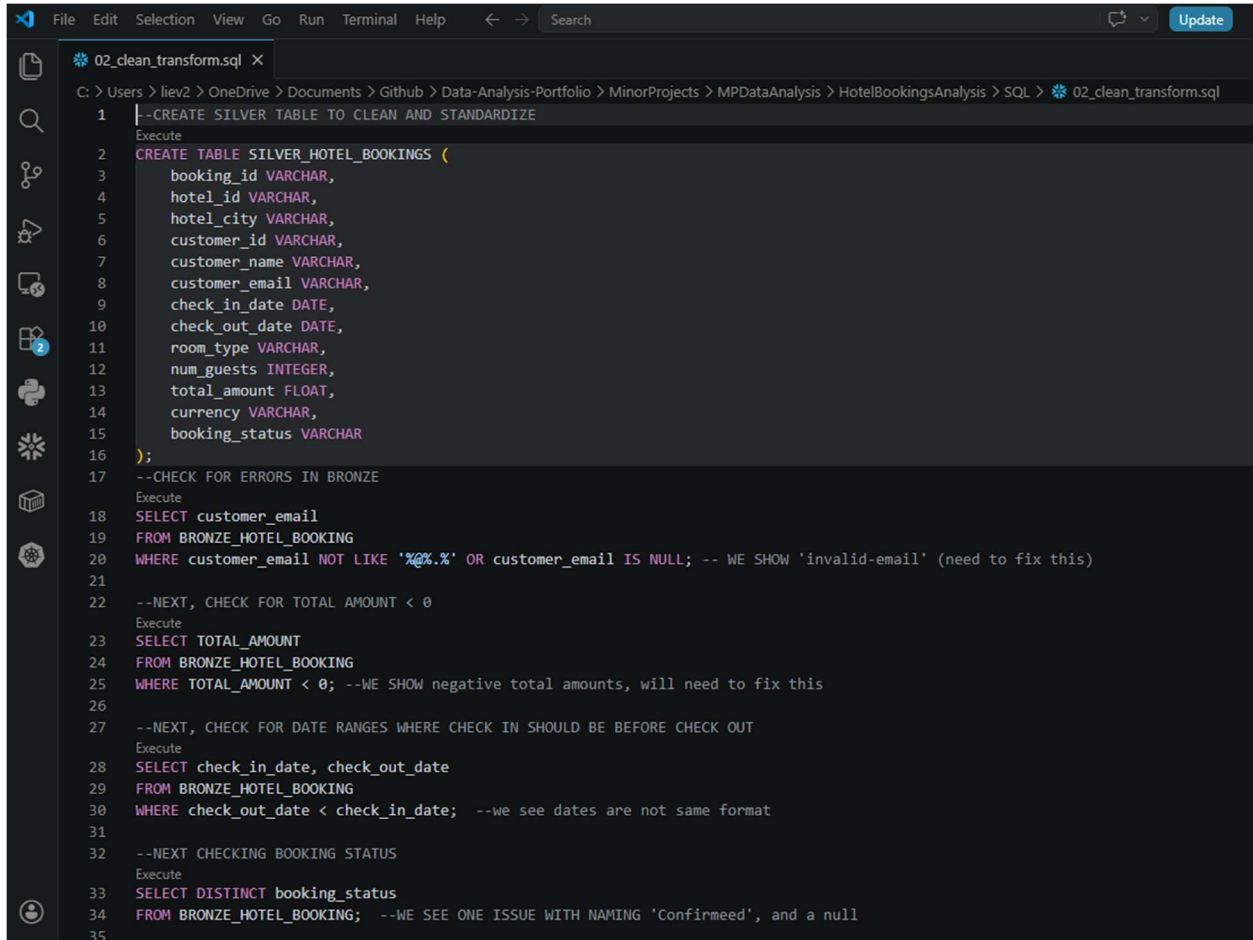
Data Warehouse & Processing Design

Bronze Layer – Raw Data Ingestion



```
File Edit Selection View Go Run Terminal Help < > Search
* 01_stage_load.sql X
C: > Users > liev2 > OneDrive > Documents > Github > Data-Analysis-Portfolio > MinorProjects > MPDataAnalysis > HotelBookingsAnalysis > SQL > * 01_stage_load.sql
Execute
1 CREATE DATABASE HOTEL_DB;
2
3 --CREATE FILE FORMAT
Execute
4 CREATE OR REPLACE FILE FORMAT FF_CSV
5     TYPE = 'CSV'
6     FIELD_OPTIONALLY_ENCLOSED_BY = '' --if any field has quotes then ignore quotes
7     SKIP_HEADER = 1 --do not need headings imported here
8     NULL_IF = ('NULL', 'null', '')
9
10 --CREATE WAITING ROOM FOR FILE (HOLD IN STAGE UNTIL WE PULL INTO FILE)
11 CREATE OR REPLACE STAGE STG_HOTEL_BOOKINGS
12     FILE_FORMAT = FF_CSV;
13
14 -- TO CREATE THE BRONZE TABLE > Follow sequence of columns from spreadsheet
Execute
15 CREATE TABLE BRONZE_HOTEL_BOOKING (
16     booking_id STRING,
17     hotel_id STRING,
18     hotel_city STRING,
19     customer_id STRING,
20     customer_name STRING,
21     customer_email STRING,
22     check_in_date STRING,
23     check_out_date STRING,
24     room_type STRING,
25     num_guests STRING,
26     total_amount STRING,
27     currency STRING,
28     booking_status STRING
29 );
30 --COPY INTO BRONZE TABLE
Execute
31 COPY INTO BRONZE_HOTEL_BOOKING
32 FROM @STG_HOTEL_BOOKINGS
33 FILE_FORMAT = (FORMAT_NAME = FF_CSV)
34 ON_ERROR = 'CONTINUE';
35 --TEST
Execute
36 SELECT * FROM BRONZE_HOTEL_BOOKING LIMIT 50
37
Ln 1, Col 26 Spaces:
```

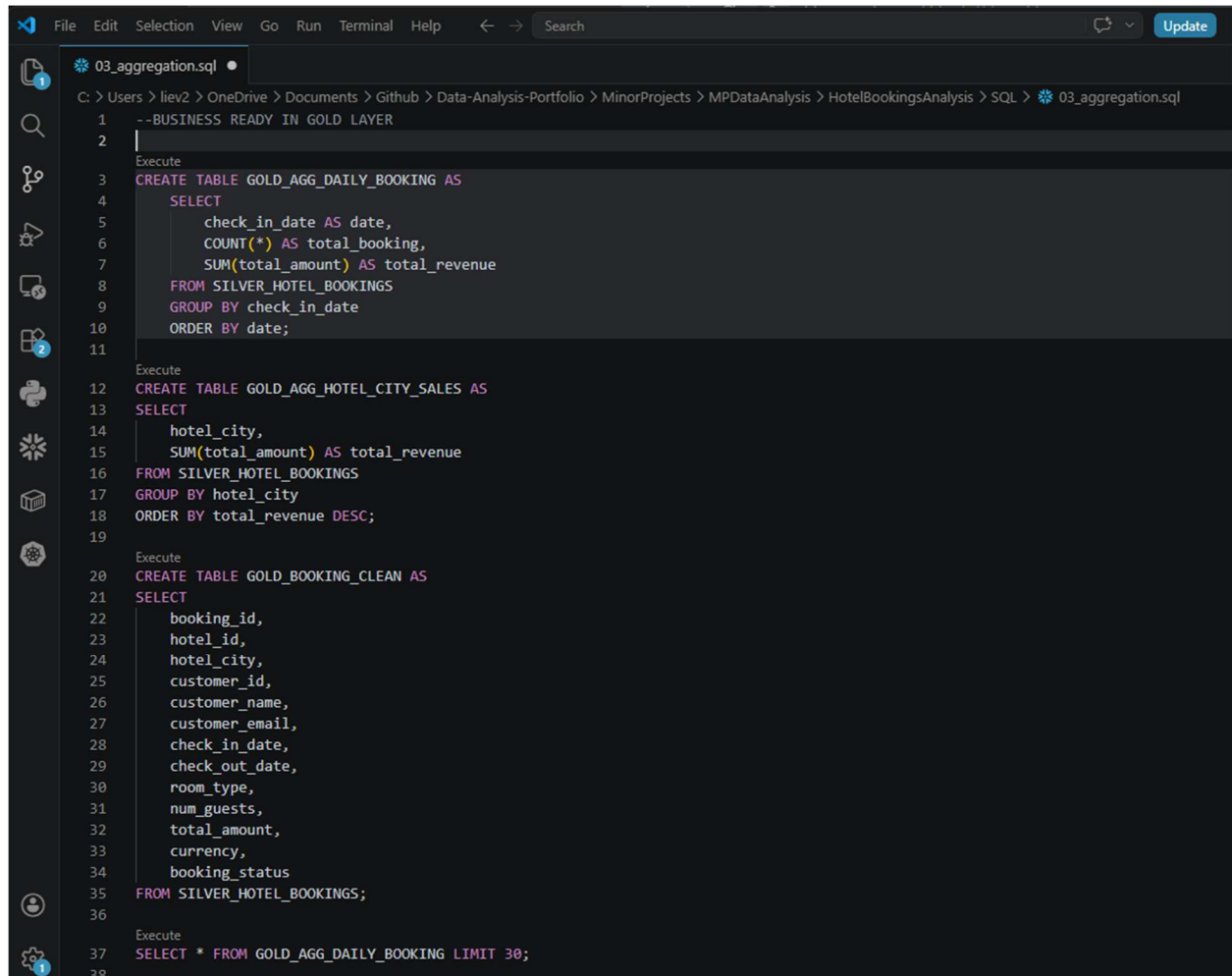
Silver Layer – Cleansed & Transformed Data



```
02_clean_transform.sql
C:\Users\liev2> OneDrive > Documents > Github > Data-Analysis-Portfolio > MinorProjects > MPDataAnalysis > HotelBookingsAnalysis > SQL > 02_clean_transform.sql
1  |--CREATE SILVER TABLE TO CLEAN AND STANDARDIZE
   Execute
2  CREATE TABLE SILVER_HOTEL_BOOKINGS (
3      booking_id VARCHAR,
4      hotel_id VARCHAR,
5      hotel_city VARCHAR,
6      customer_id VARCHAR,
7      customer_name VARCHAR,
8      customer_email VARCHAR,
9      check_in_date DATE,
10     check_out_date DATE,
11     room_type VARCHAR,
12     num_guests INTEGER,
13     total_amount FLOAT,
14     currency VARCHAR,
15     booking_status VARCHAR
16 );
17 --CHECK FOR ERRORS IN BRONZE
   Execute
18 SELECT customer_email
19 FROM BRONZE_HOTEL_BOOKING
20 WHERE customer_email NOT LIKE '%@%.%' OR customer_email IS NULL; -- WE SHOW 'invalid-email' (need to fix this)
21
22 --NEXT, CHECK FOR TOTAL AMOUNT < 0
   Execute
23 SELECT TOTAL_AMOUNT
24 FROM BRONZE_HOTEL_BOOKING
25 WHERE TOTAL_AMOUNT < 0; --WE SHOW negative total amounts, will need to fix this
26
27 --NEXT, CHECK FOR DATE RANGES WHERE CHECK IN SHOULD BE BEFORE CHECK OUT
   Execute
28 SELECT check_in_date, check_out_date
29 FROM BRONZE_HOTEL_BOOKING
30 WHERE check_out_date < check_in_date; --we see dates are not same format
31
32 --NEXT CHECKING BOOKING STATUS
   Execute
33 SELECT DISTINCT booking_status
34 FROM BRONZE_HOTEL_BOOKING; --WE SEE ONE ISSUE WITH NAMING 'Confirmeed', and a null
35
```

```
File Edit Selection View Go Run Terminal Help ← → Search
02_clean_transform.sql X
C:\Users\liev2> OneDrive> Documents> Github> Data-Analysis-Portfolio> MinorProjects> MPDataAnalysis> HotelBookingsAnalysis> SQL> 02_clean_transform.sql
36 ---INSERT DATA FROM BRONZE TO SILVER AND CLEAN IN THE SILVER THE ISSUES WE SAW IN THE BRONZE---
Execute
37 INSERT INTO SILVER_HOTEL_BOOKINGS
38 SELECT
39     booking_id,
40     hotel_id,
41     INITCAP(TRIM(hotel_city)) AS hotel_city,
42     customer_id,
43     INITCAP(TRIM(customer_name)) AS customer_name,
44     CASE
45         WHEN customer_email LIKE '%@%.%' THEN LOWER(TRIM(customer_email))
46         ELSE NULL
47     END AS customer_email,
48     TRY_TO_DATE(NULLIF(check_in_date, '')) AS check_in_date,
49     TRY_TO_DATE(NULLIF(check_out_date, '')) AS check_out_date,
50     room_type,
51     num_guests,
52     ABS(TRY_TO_NUMBER(total_amount)) AS total_amount,
53     currency,
54     CASE
55         WHEN LOWER(booking_status) in ('confirmeed', 'confirmd') THEN 'Confirmed'
56         ELSE booking_status
57     END AS booking_status
58 FROM BRONZE_HOTEL_BOOKING
59 WHERE
60     TRY_TO_DATE(check_in_date) IS NOT NULL
61     AND TRY_TO_DATE(check_out_date) IS NOT NULL
62     AND TRY_TO_DATE(check_out_date) >= TRY_TO_DATE(check_in_date);
63
Execute
64 SELECT * FROM SILVER_HOTEL_BOOKINGS LIMIT 30;
```

Gold Layer – Business Ready Data



```
03_aggregation.sql
C:\Users\liev2> OneDrive > Documents > Github > Data-Analysis-Portfolio > MinorProjects > MPDataAnalysis > HotelBookingsAnalysis > SQL > 03_aggregation.sql
1  --BUSINESS READY IN GOLD LAYER
2
3  Execute
4  CREATE TABLE GOLD_AGG_DAILY_BOOKING AS
5  SELECT
6      check_in_date AS date,
7      COUNT(*) AS total_booking,
8      SUM(total_amount) AS total_revenue
9  FROM SILVER_HOTEL_BOOKINGS
10 GROUP BY check_in_date
11 ORDER BY date;
12
13 Execute
14 CREATE TABLE GOLD_AGG_HOTEL_CITY_SALES AS
15 SELECT
16     hotel_city,
17     SUM(total_amount) AS total_revenue
18 FROM SILVER_HOTEL_BOOKINGS
19 GROUP BY hotel_city
20 ORDER BY total_revenue DESC;
21
22 Execute
23 CREATE TABLE GOLD_BOOKING_CLEAN AS
24 SELECT
25     booking_id,
26     hotel_id,
27     hotel_city,
28     customer_id,
29     customer_name,
30     customer_email,
31     check_in_date,
32     check_out_date,
33     room_type,
34     num_guests,
35     total_amount,
36     currency,
37     booking_status
38 FROM SILVER_HOTEL_BOOKINGS;
39
40 Execute
41 SELECT * FROM GOLD_AGG_DAILY_BOOKING LIMIT 30;
```

Dashboard & Reporting– Hotel Bookings Analytics



Summary of Findings

This end-to-end Hotel Booking Analytics project successfully transformed raw and inconsistent hotel booking data into a reliable, business-ready analytics solution using the Snowflake Medallion Architecture and SnowSight dashboards.

The project began with cleansing and standardizing raw booking data by resolving missing values, correcting date inconsistencies, and removing duplicates to improve overall data quality and reporting accuracy. Through the Bronze, Silver, and Gold data processing layers in Snowflake, the data was progressively refined into trusted analytical datasets optimized for reporting and decision-making.

The final SnowSight dashboard provided management with a centralized and easy-to-interpret view of hotel performance metrics. Key KPIs revealed:

- **Total Revenue:** 577,347
- **Total Bookings:** 1,729
- **Total Guests:** 5,072
- **Average Booking Value:** 334.11

Trend analysis showed relatively stable monthly booking activity and revenue generation, with seasonal fluctuations indicating periods of higher customer demand. City-level analysis identified the highest revenue-generating locations, enabling management to better understand regional performance and potential growth opportunities. Additionally, booking type and booking status analysis provided visibility into customer preferences, cancellation behavior, and operational performance.

Overall, the project delivered:

- Accurate and validated monthly metrics
- Clean and standardized reporting data
- Actionable business insights for leadership
- Improved visibility into hotel operational trends
- A scalable Snowflake-based analytics framework for future reporting enhancements

The completed solution demonstrates how cloud data warehousing and modern analytics platforms can convert raw operational data into meaningful business intelligence that supports faster and more informed decision-making.