Project Title: Comprehensive Analysis of Hotel Booking Data

Project Idea

The aim of this project is to analyze hotel booking data to gain insights into guest behaviors, booking trends, and operational factors that influence hotel performance. The dataset includes detailed records of bookings for both city and resort hotels, capturing aspects such as booking cancellations, guest demographics, and room assignment preferences. By answering a series of strategic questions, this project seeks to:

1. Understand seasonal and weekly trends in hotel reservations.
2. Investigate factors leading to booking cancellations.
3. Examine guest preferences for room types and additional services.
4. Evaluate guest loyalty and booking patterns by region and contact method.
5. Provide actionable recommendations to improve booking efficiency and guest satisfaction.

Content Outline

1. **Introduction**
    - Overview of the project and its objectives.
    - Importance of analyzing hotel booking data.
2. **Dataset Details**
    - Description of the dataset, including columns and their meanings.
    - Data source and scope.
3. **Steps to Import Data**
    - Explanation of how the dataset was prepared and uploaded to SQL Server.
    - Challenges faced during data import and resolutions.
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    - Queries and results for understanding the dataset's general structure.
    - Preliminary insights from basic analysis.
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    - List of analysis questions with clear objectives.
    - SQL queries written to answer each question and their results.

- Key insights drawn from the answers.

6. **Key Insights and Conclusions**
   - Major findings from the data analysis.
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   - Practical suggestions to optimize hotel operations based on analysis findings.
   - Actionable strategies for enhancing guest satisfaction and revenue generation.

Introduction

Have you ever wondered when the best time of year to book a hotel room is? Or the optimal length of stay to get the best daily rate? What if you wanted to predict whether or not a hotel was likely to receive a disproportionately high number of special requests? This project delves into these intriguing questions by analyzing a rich dataset of hotel booking records. Through this analysis, we aim to uncover patterns and trends that can help hotels enhance their operations and inform potential guests on how to optimize their bookings.

Incorporating structured queries and compelling visualizations, this analysis aspires to provide actionable insights for hotel management and inspire data-driven decision-making.

Furthermore, the project focuses on evaluating guest satisfaction indicators, understanding reservation dynamics, and suggesting recommendations to refine operational efficiency. By bridging raw data with strategic conclusions, it demonstrates the power of database tools like SQL in solving real-world challenges.

Dataset Details

The data for this analysis was sourced from the Kaggle dataset titled “Hotel Booking Demand”, available at: Kaggle Dataset Link. This dataset contains extensive records of hotel bookings, providing a wide variety of attributes for analysis. Below is a detailed description of each column in the dataset:

1. **hotel**: The type or name of the hotel (e.g., "Resort Hotel" or "City Hotel"). This helps categorize bookings by hotel type.
2. **is_canceled**: A binary column indicating whether the booking was canceled (1 for canceled, 0 for not canceled).
3. **lead_time**: The number of days between the booking date and the arrival date.
4. **arrival_date_year**: The year of the booking's arrival date.

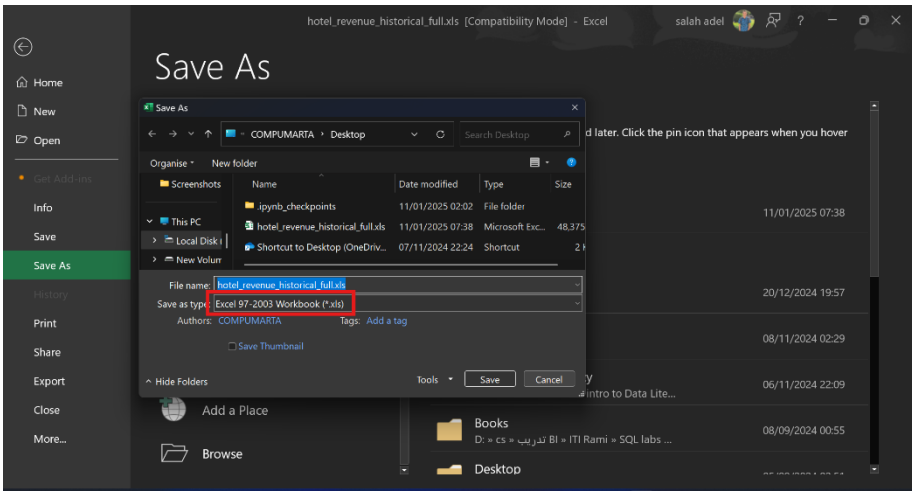
5. **arrival_date_month**: The month of the arrival date as a string (e.g., "January", "February").
6. **arrival_date_week_number**: The week number (1–52) of the arrival date in a year.
7. **arrival_date_day_of_month**: The specific day of the month of the arrival date (e.g., 1–31).
8. **stays_in_weekend_nights**: The number of weekend nights (Saturday or Sunday) that the guests stayed or planned to stay.
9. **stays_in_week_nights**: The number of weeknights (Monday to Friday) that the guests stayed or planned to stay.
10. **adults**: The number of adults in the booking.
11. **children**: The number of children in the booking (aged below a certain threshold, often 12).
12. **babies**: The number of babies in the booking (e.g., infants or toddlers below a specific age).
13. **meal**: The type of meal plan associated with the booking (e.g., "BB" for Bed & Breakfast, "FB" for Full Board).
14. **country**: The country of origin of the guest. It may be in ISO 2-letter codes (e.g., "US" for the United States).
15. **market_segment**: The market segment for the booking (e.g., "Direct", "Corporate", "Online TA" [Online Travel Agent]).
16. **distribution_channel**: The channel through which the booking was made (e.g., "Direct", "TA/TO" [Travel Agent/Tour Operator]).
17. **is_repeated_guest**: A binary column indicating whether the guest has stayed at the hotel before (1 for yes, 0 for no).
18. **previous_cancellations**: The number of previous bookings by the guest that were canceled.
19. **previous_bookings_not_canceled**: The number of previous bookings by the guest that were not canceled.
20. **reserved_room_type**: The type of room the guest initially reserved (e.g., "A", "B").
21. **assigned_room_type**: The type of room the guest was eventually assigned. It may differ from the reserved room due to availability.
22. **booking_changes**: The number of changes made to the booking after the initial reservation.

23. **deposit_type**: The type of deposit associated with the booking (e.g., "No Deposit", "Non-Refund", "Refundable").
24. **agent**: The ID of the travel agent who made the booking (if applicable).
25. **company**: The ID of the company responsible for the booking (if applicable).
26. **days_in_waiting_list**: The number of days the booking was on a waiting list before being confirmed.
27. **customer_type**: The classification of the customer based on the purpose of their stay (e.g., "Transient", "Contract", "Group").
28. **adr (Average Daily Rate)**: The average revenue per available room for the booking (calculated as total revenue/number of nights).
29. **required_car_parking_spaces**: The number of car parking spaces requested by the guest.
30. **total_of_special_requests**: The number of special requests made by the guest (e.g., extra pillows, higher floor).
31. **reservation_status**: The current status of the booking (e.g., "Canceled", "Checked-Out", "No-Show").
32. **reservation_status_date**: The date when the current reservation status was set.

This dataset's diverse and detailed attributes make it a valuable resource for addressing key questions in the hospitality industry.

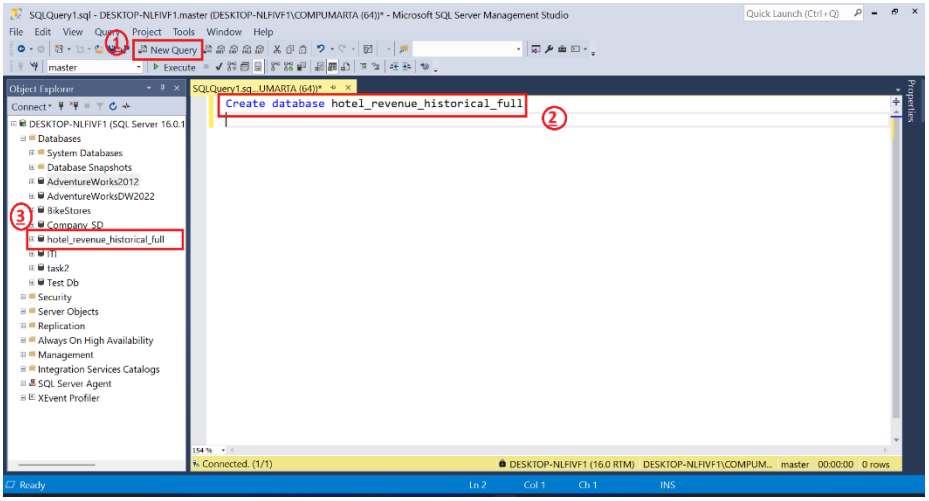
Steps to Import Data

1. **Prepare Your Excel File**
    - Save your dataset as an .xls, .xlsx, or .csv file format.

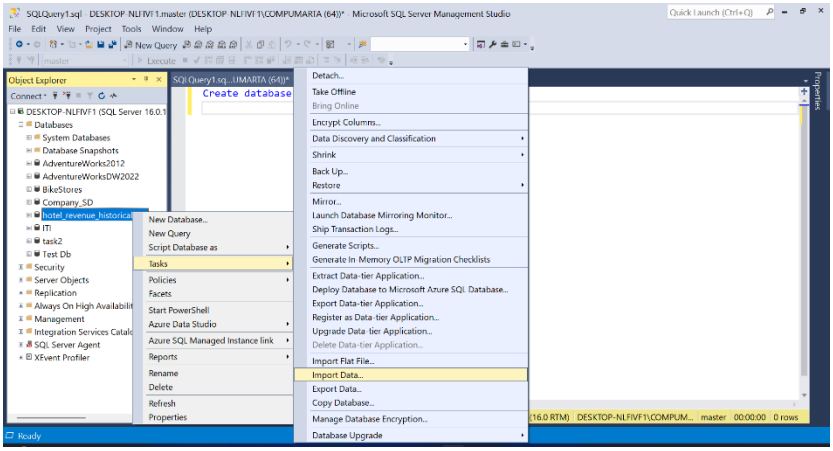


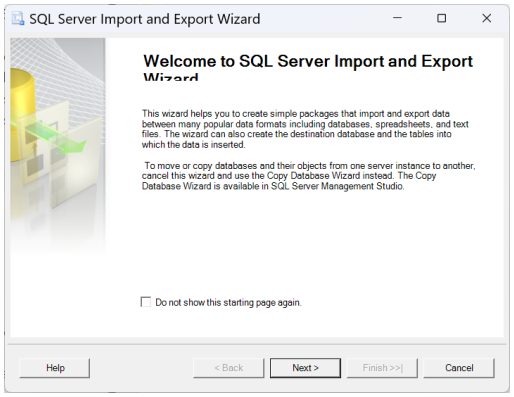
2. **Set Up Your SQL Database**

- Create or select the database where the data will be stored.



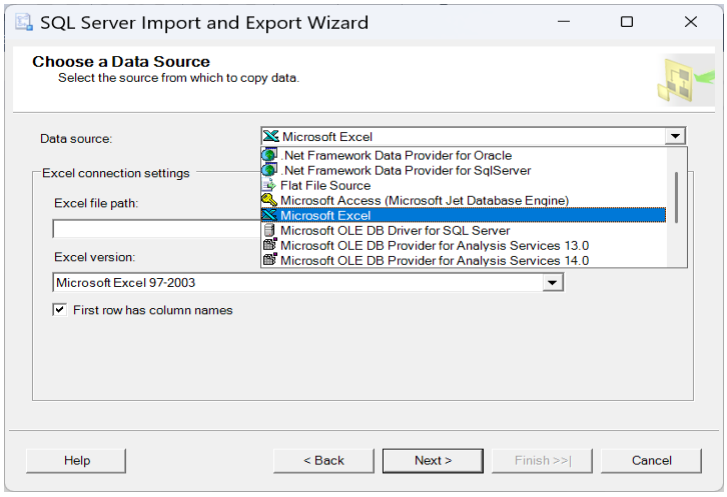
3. **Launch the SQL Server Import and Export Wizard**
   - Right-click your database name and select **Tasks > Import Data**.
   - The **SQL Server Import and Export Wizard** will open.

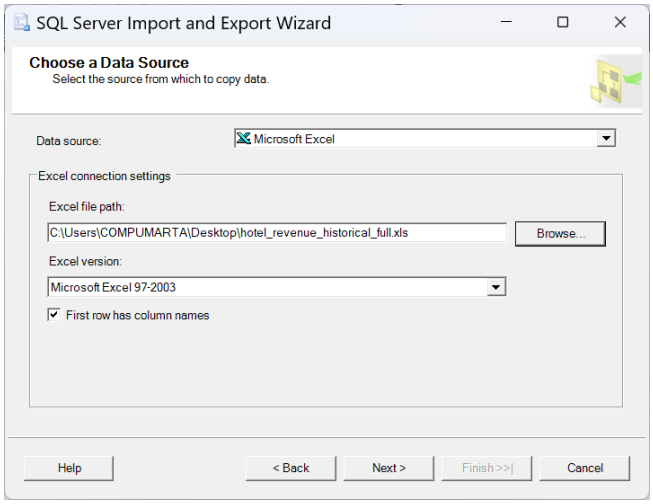




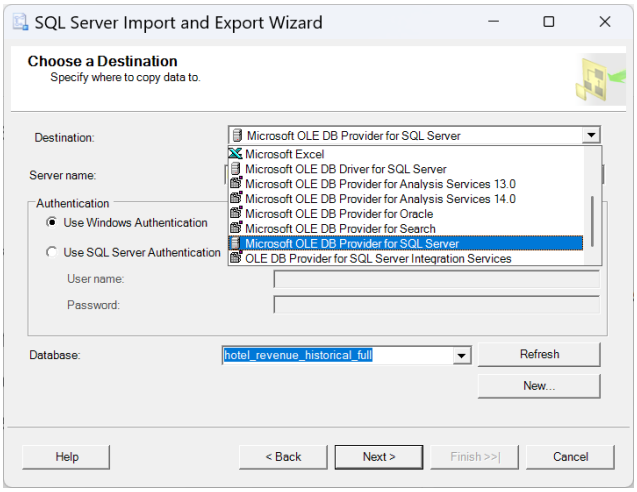
4. **Configure the Data Source**
   - In the **Data Source** dropdown, select **Microsoft Excel**.
   - Click **Browse** to locate and select your Excel file.
   - Choose the correct Excel version based on your file type:
     - .xls: Microsoft Excel 97-2003
     - .xlsx: Microsoft Excel 2007 or newer

- Check the **First row has column names** checkbox if your Excel file includes headers.



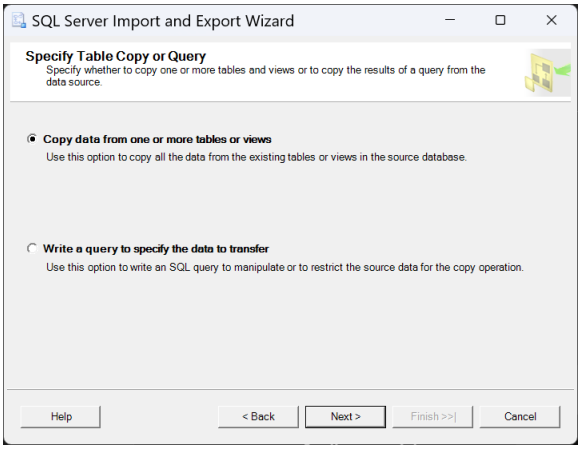


5. **Set Up the Destination**
   - Select **Microsoft OLE DB Provider for SQL Server** as the destination.
   - Specify your server and authentication details.
   - Choose the database where the data will be imported.

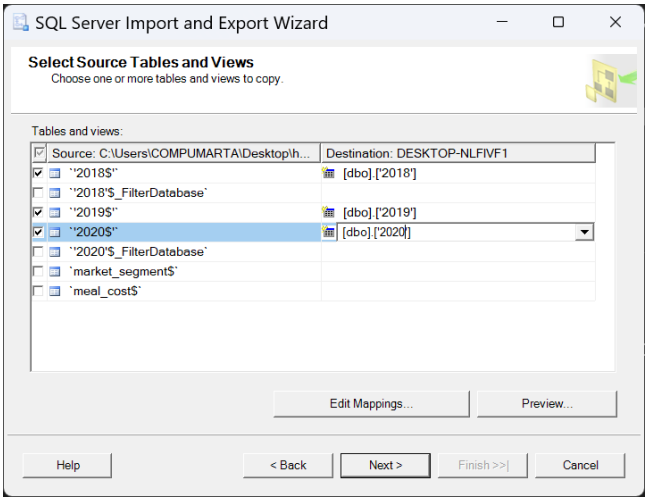


6. **Choose the Data to Transfer**
   - Option 1: Copy Data from One or More Tables or Views.
     - Use this option to import entire tables or views without filtering.
   - Option 2: Write a Query to Specify the Data to Transfer.

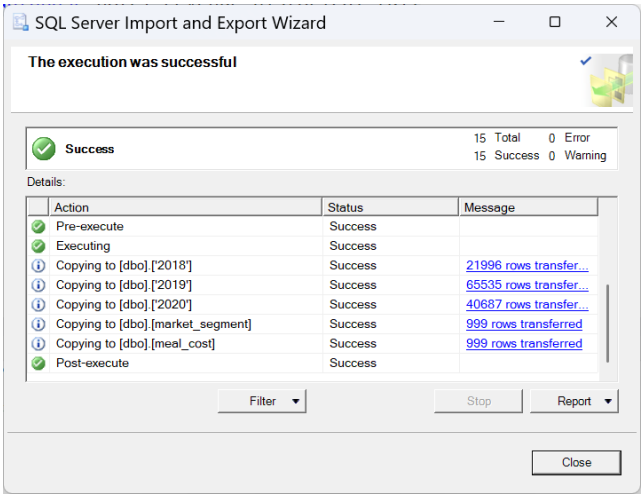
- Use this option to define custom SQL queries for specific data import.



7. **Map the Data**
   - Review the column mappings to ensure that the source data matches the destination table structure.



8. **Execute the Import Process**
   - Click **Next** and then **Finish** to start the import process.
   - Monitor the progress and confirm the success of the import.



Exploring the Data

This section outlines the initial steps for exploring the dataset after it has been successfully imported into the SQL database. The first task involves merging individual year-based tables into a unified view for analysis. The subsequent step is to preview the merged data to verify its structure and content.

Step 1: Merging the Tables

To consolidate data from different years (2018, 2019, 2020) into one cohesive view, we create a SQL View named DBO.Hotel. This View unifies data from the respective year-based tables using the UNION command:

```
CREATE VIEW DBO.Hotel AS
SELECT * FROM dbo.[2018]
UNION
SELECT * FROM dbo.[2019]
UNION
SELECT * FROM dbo.[2020];
```

This command combines the three tables into one logical structure, enabling efficient querying and analysis across all years.

Step 2: Displaying the Merged Data

To examine the data and ensure the View was created correctly, we use the following query:

```
-- Examine a sample of data:
SELECT * FROM Hotel;
```

This query retrieves all columns and records from the unified View. Running this query helps verify that the data has been integrated seamlessly and allows us to inspect the contents for further analysis.

Outcome

By combining data from multiple tables into a single View, we simplify the subsequent analytical processes and facilitate a comprehensive exploration of the dataset spanning all years.

Data Analysis Questions and Answers

This page is dedicated to addressing key analytical questions using the hotel booking dataset. Each query highlights its purpose and the associated SQL code to generate insights.

Hotel Type Distribution:

Question 1: How many bookings were made for each hotel type?

Purpose: Analyze the distribution of bookings across different hotel types.

```
SELECT
    hotel AS "Hotel Type",
    COUNT(hotel) AS "Total Bookings",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage"
FROM Hotel
```

```
GROUP BY hotel
ORDER BY "Total Bookings" DESC;
```

- Result: City Hotels accounted for 60.31% of total bookings, while Resort Hotels made up 39.69%.

Cancellation Analysis:

Question 2: How many bookings were canceled and how many were not canceled?

Purpose: Evaluate booking reliability and cancellation patterns.

```
SELECT
    CASE
        WHEN is_canceled = 0 THEN 'Not Canceled'
        ELSE 'Canceled'
    END AS "Booking Status",
    COUNT(is_canceled) AS "Total Bookings",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage"
FROM Hotel
WHERE is_canceled IS NOT NULL
GROUP BY is_canceled;
```

- Result: 29.27% of bookings were canceled, and 70.73% were not canceled, showcasing a robust booking completion rate.

Lead Time Analysis:

Question 3: What is the average lead time for bookings?

Purpose: Understand booking patterns and customer planning behavior.

```
SELECT
    ROUND(AVG(lead_time), 0) AS "Average Lead Days",
    ROUND(MIN(lead_time), 0) AS "Minimum Lead Days",
    ROUND(MAX(lead_time), 0) AS "Maximum Lead Days"
FROM Hotel;
```

- Result: The average lead time for bookings was 80 days, indicating a notable preference for advanced reservations.

Family Bookings Analysis:

Question 4: How many bookings were made with children, babies, or both?

Purpose: Analyze family travel patterns.

```
SELECT
    CASE
        WHEN children > 0 AND babies > 0 THEN 'Both Children and Babies'
        WHEN children > 0 THEN 'With Children Only'
        WHEN babies > 0 THEN 'With Babies Only'
        ELSE 'No Children or Babies'
    END AS "Family Type",
    COUNT(*) AS "Total Bookings",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage"
FROM Hotel
GROUP BY
```

```
    CASE
        WHEN children > 0 AND babies > 0 THEN 'Both Children and Babies'
        WHEN children > 0 THEN 'With Children Only'
        WHEN babies > 0 THEN 'With Babies Only'
        ELSE 'No Children or Babies'
    END;
```

- Result: 89.59% of bookings were made without children or babies, while 9.33% included children only, and 0.87% included babies only.

Special Requests Analysis:

Question 5: How many bookings included special requests?

Purpose: Reveals whether basic services meet guest needs or additional amenities are needed.

```
SELECT CASE
            WHEN total_of_special_requests > 0 THEN 'Bookings With Special
Requests'
            ELSE 'Bookings Without Special Requests'
        END AS "Type Of Bookings",
        COUNT(*) AS "Total Bookings",
        ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage"
FROM Hotel
GROUP BY CASE
            WHEN total_of_special_requests > 0 THEN 'Bookings With Special
Requests'
            ELSE 'Bookings Without Special Requests'
        END;
```

- Result: 49.67% of bookings included special requests, indicating a significant demand for additional services.

Geographic Distribution:

Question 6: What is the proportion of guests by country of origin?

Purpose: To identify key markets for targeted marketing campaigns.

```
SELECT TOP 10
    country AS "Country",
    COUNT(*) AS "Total Bookings",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage"
FROM Hotel
GROUP BY country
ORDER BY "Total Bookings" DESC;
```

- Result: The majority of guests came from Portugal (PRT), accounting for 33.37% of bookings, followed by the UK (GBR) at 11.61%.

Monthly Booking Trends:

Question 7: Which month of the year sees the highest and lowest bookings?

Purpose: To identify seasonal patterns and peak, off-season periods.

```sql
SELECT
    arrival_date_year AS "Year",
    arrival_date_month AS "Month",
    COUNT(*) AS "Total Bookings",
    ROUND(AVG(adr), 2) AS "Average Daily Rate",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage"
FROM Hotel
GROUP BY arrival_date_year, arrival_date_month
ORDER BY arrival_date_year,
    CASE arrival_date_month
        WHEN 'January' THEN 1
        WHEN 'February' THEN 2
        WHEN 'March' THEN 3
        WHEN 'April' THEN 4
        WHEN 'May' THEN 5
        WHEN 'June' THEN 6
        WHEN 'July' THEN 7
        WHEN 'August' THEN 8
        WHEN 'September' THEN 9
        WHEN 'October' THEN 10
        WHEN 'November' THEN 11
        WHEN 'December' THEN 12
    END;
```

- Result: Bookings and revenue peaked during the summer months (July and August). The lowest bookings were observed in November and December, suggesting off-peak periods.

Market Segment Analysis:

Question 8: Which market segment generates the most bookings?

Purpose: To analyze the popularity of various market segments.

```sql
SELECT
    market_segment AS "Segment",
    COUNT(*) AS "Total Bookings",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage",
    ROUND(AVG(adr), 2) AS "Average Daily Rate",
    ROUND(SUM(CASE WHEN is_canceled = 1 THEN 1 ELSE 0 END) * 100.0 / COUNT(*), 2)
AS "Cancellation Rate"
FROM Hotel
GROUP BY market_segment
ORDER BY "Total Bookings" DESC;
```

- Result: The Online Travel Agent (Online TA) segment generated the most bookings (58.85%), with an average daily rate (ADR) of $118.05, followed by Offline TA/TO (16%) and an ADR of $82.33.

Distribution Channel Efficiency:

Question 9: What is the ratio of bookings made through various methods (e.g., direct, agent, OTA)?

Purpose: Helps analyze the efficiency and popularity of distribution channels.

```sql
SELECT
    distribution_channel AS "Channel",
```

```
    COUNT(*) AS "Total Bookings",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage",
    ROUND(AVG(lead_time), 0) AS "Average Lead Time",
    ROUND(AVG(adr), 2) AS "Average Daily Rate"
FROM Hotel
GROUP BY distribution_channel
ORDER BY "Total Bookings" DESC;
```

- Result: The TA/TO channel generated the most bookings (79.23%), with an average daily rate (ADR) of $ 108.42.

Room Type Analysis:

Question 10: What is the ratio of guests who were assigned a different room type than they reserved?

Purpose: Identifies potential issues with room availability and booking accuracy.

```
SELECT CASE
            WHEN reserved_room_type = assigned_room_type THEN 'Matched
Assignments'
            ELSE'Not Matched Assignments'
        END AS "Room Type",
        COUNT(*) AS "Total Reservations",
        ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage"
FROM Hotel
GROUP BY CASE
            WHEN reserved_room_type = assigned_room_type THEN 'Matched
Assignments'
            ELSE'Not Matched Assignments'
        END;
```

- Result: 85.23% of reservations were assigned the same room type that guests initially reserved, and 14.77% of reservations were assigned a different room type than what was originally reserved.

Question 11: What is the most frequently requested room type?

Purpose: To analyze demand and optimize inventory for popular room types.

```
SELECT reserved_room_type, COUNT(reserved_room_type) AS "Total Bookings"
FROM Hotel
GROUP BY reserved_room_type
ORDER BY "Total Bookings" DESC;
```

- Result: Room type **A** was the most frequently requested, accounting for 58,791 bookings, followed by room type **D** with 17,912 bookings.

Length of Stay Patterns:

Question 12:

```
WITH StayLength AS (
    SELECT
        (stays_in_weekend_nights + stays_in_week_nights) AS total_nights
    FROM Hotel
)
```

```
SELECT
    CASE
        WHEN total_nights <= 1 THEN '1 Night'
        WHEN total_nights <= 3 THEN '2-3 Nights'
        WHEN total_nights <= 7 THEN '4-7 Nights'
        ELSE '8+ Nights'
    END AS "Stay Duration",
    COUNT(*) AS "Total Bookings",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage"
FROM StayLength
GROUP BY
    CASE
        WHEN total_nights <= 1 THEN '1 Night'
        WHEN total_nights <= 3 THEN '2-3 Nights'
        WHEN total_nights <= 7 THEN '4-7 Nights'
        ELSE '8+ Nights'
    END
ORDER BY
    CASE
        WHEN total_nights <= 1 THEN '1 Night'
        WHEN total_nights <= 3 THEN '2-3 Nights'
        WHEN total_nights <= 7 THEN '4-7 Nights'
        ELSE '8+ Nights'
    END;
```

- Result: 38.28% of bookings were for 2-3 nights, while 35.85% were for 4-7 nights, and 20.15% were for 1 night. Only 5.72% of bookings were for 8+ nights.

Guest Type Analysis:

Question 13: What is the distribution of customers based on their purpose of stay (e.g., transient, group, contract)?"

Purpose: Helps segment customers for tailored service and marketing.

```
SELECT
    customer_type AS "Guest Type",
    COUNT(*) AS "Total Guests",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage",
    ROUND(AVG(adr), 2) AS "Average Daily Rate",
    ROUND(AVG(total_of_special_requests), 2) AS "Average Special Requests"
FROM Hotel
GROUP BY customer_type
ORDER BY "Total Guests" DESC;
```

- Result: Transient guests (81.96%) were the most common, followed by Transient-Party (13.52%) and Contract guests (3.88%).

Meal Plan Preferences:

Question 14: What is the ratio of meal plans chosen by guests?

Purpose: To optimize inventory and resource planning for catering services.

```
SELECT
    meal AS "Meal Plan",
    COUNT(*) AS "Total Bookings",
    ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage",
```

```
    ROUND(AVG(adr), 2) AS "Average Daily Rate",
    ROUND(SUM(CASE WHEN is_canceled = 1 THEN 1 ELSE 0 END) * 100.0 / COUNT(*), 2)
AS "Cancellation Rate"
FROM Hotel
GROUP BY meal
ORDER BY "Total Bookings" DESC;
```

- Result: Bed & Breakfast (BB) was the most popular meal plan, chosen in 77.87% of bookings, followed by Half Board (HB) at 10.64%.

Parking Requirements Analysis:

Question 15: What is the percentage of guests who requested parking spaces?

Purpose: To evaluate the demand for parking facilities.

```
SELECT CASE
            WHEN required_car_parking_spaces = 0 THEN 'No Required Parking
Spaces'
            ELSE 'Required Parking Spaces'
        END AS "Parking Spaces",
        COUNT(*) AS "Total Requests",
        ROUND(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER(), 2) AS "Percentage",
        ROUND(AVG(adr), 2) AS "Average Daily Rate"
FROM Hotel
GROUP BY CASE
            WHEN required_car_parking_spaces = 0 THEN 'No Required Parking
Spaces'
            ELSE 'Required Parking Spaces'
        END;
```

- Result: 91.76% of guests did not require parking spaces, while 8.24% requested parking.

Customer Retention Metrics:

Question 16: What is the percentage of new versus returning guests?

Purpose: Measures guest retention and loyalty and Indicates the success of marketing campaigns in attracting new guests.

```
SELECT
    CASE
        WHEN is_repeated_guest = 0 THEN 'New Guest'
        ELSE 'Returning Guest'
    END AS "Guest Type",
    COUNT(*) AS "Total Guests",
    CAST(COUNT(*) * 100.0 / SUM(COUNT(*)) OVER() AS DECIMAL(5,2)) AS Percentage
FROM Hotel
GROUP BY is_repeated_guest;
```

- Result: 96.13% of guests were new, while only 3.87% were returning guests.

Booking Patterns:

Question 17: What is the number of weekend booking to weekday booking?

Purpose: To understanding guest preferences for short leisure trips versus business stays.

```
SELECT
        SUM(CASE WHEN stays_in_weekend_nights > 0 THEN 1 ELSE 0 END) AS
weekend_bookings,
        SUM(CASE WHEN stays_in_week_nights > 0 THEN 1 ELSE 0 END) AS
weekday_bookings
FROM Hotel;
```

Annual Revenue Performance by Hotel Type:

Question 18: How does total revenue differ by hotel type annually?

Purpose: This query provides an annual breakdown of total revenue, categorized by hotel type.

- Tracks year-over-year growth and hotel-type performance.

```
SELECT
    arrival_date_year AS "Year",
    hotel AS "Hotel Type",
    ROUND(SUM((stays_in_weekend_nights + stays_in_week_nights) * adr), 2) AS
"Total Revenue",
    COUNT(DISTINCT arrival_date_month) AS "Operating Months",
    ROUND(SUM((stays_in_weekend_nights + stays_in_week_nights) * adr) /
          COUNT(DISTINCT arrival_date_month), 2) AS "Average Monthly Revenue"
FROM Hotel
WHERE is_canceled = 0  -- Only consider non-canceled bookings
GROUP BY arrival_date_year, hotel
ORDER BY arrival_date_year, "Total Revenue" DESC;
```

- Result: **City Hotels** consistently generated higher revenue compared to **Resort Hotels** across all years.

Monthly Revenue Trends with Seasonal Analysis:

Question 19: What is the monthly revenue trend across all years?

Purpose: This query helps track revenue trends on a monthly basis.

- Identifies peak revenue months and weekend vs. weekday performance

```
SELECT
    arrival_date_month AS "Month",
    ROUND(SUM(CASE WHEN stays_in_weekend_nights > 0 THEN stays_in_weekend_nights
* adr ELSE 0 END), 2) AS "Weekend Revenue",
    ROUND(SUM(CASE WHEN stays_in_week_nights > 0 THEN stays_in_week_nights * adr
ELSE 0 END), 2) AS "Weekday Revenue",
    ROUND(AVG(adr), 2) AS "Average Daily Rate",
    COUNT(*) AS "Total Bookings"
FROM Hotel
WHERE is_canceled = 0
GROUP BY arrival_date_month
ORDER BY
    CASE arrival_date_month
        WHEN 'January' THEN 1
        WHEN 'February' THEN 2
        WHEN 'March' THEN 3
        WHEN 'April' THEN 4
        WHEN 'May' THEN 5
```

```
        WHEN 'June' THEN 6
        WHEN 'July' THEN 7
        WHEN 'August' THEN 8
        WHEN 'September' THEN 9
        WHEN 'October' THEN 10
        WHEN 'November' THEN 11
        WHEN 'December' THEN 12
    END;
```

- Result: The highest revenue months were **July** and **August**.

Revenue by Room Type:

Question 20: What are trends in customer preferences for room types, and how do these preferences influence revenue?

Purpose: This query analyzes preferences and revenue trends for the types of rooms booked.

```
SELECT
    reserved_room_type AS "Room Type",
    COUNT(*) AS "Total Bookings",
    ROUND(AVG(adr), 2) AS "Average Daily Rate",
    SUM(CASE WHEN is_canceled = 0 THEN (stays_in_weekend_nights +
stays_in_week_nights) ELSE 0 END) AS "Total Nights Stayed",
    ROUND(SUM((CASE WHEN is_canceled = 0 THEN (stays_in_weekend_nights +
stays_in_week_nights) ELSE 0 END) * adr), 2) AS "Total Revenue"
FROM Hotel
GROUP BY reserved_room_type
ORDER BY "Total Revenue" DESC;
```

- Result: The highest revenue room type **A**.

Revenue Impact Factors:

Question 21: What key factors significantly impact hotel revenue annually?

Purpose: Factors include hotel type, market segment, meal plans, and total nights booked.

- Identifies key factors affecting revenue performance.

```
SELECT
    hotel AS "Hotel Type",
    meal AS "Meal Plan",
    ROUND(AVG(adr), 2) AS "Average Daily Rate",
    ROUND(SUM((stays_in_weekend_nights + stays_in_week_nights) * adr), 2) AS
"Total Revenue",
    COUNT(*) AS "Total Bookings",
    ROUND(SUM(CASE WHEN is_canceled = 1 THEN 1 ELSE 0 END) * 100.0 / COUNT(*), 2)
AS "Cancellation Rate",
    ROUND(AVG(lead_time), 0) AS "Average Lead Time",
    ROUND(AVG(total_of_special_requests), 2) AS "Average Special Requests"
FROM Hotel
GROUP BY hotel, meal
ORDER BY "Total Revenue" DESC;
```

Key Trends and Patterns:

1. Seasonal Trends:

- Bookings and revenue peaked during the summer months (**July** and **August**), indicating a strong seasonal influence on hotel bookings.
- The lowest bookings were observed in **November** and **December**, suggesting off-peak periods.

2. Cancellation Patterns:

- City Hotels had a higher cancellation rate (65.35%) compared to Resort Hotels (34.65%), possibly due to the nature of bookings (e.g., business vs. leisure).

3. Guest Preferences:

- Guests preferred shorter stays (2-3 nights) and room type **A**, which was the most popular.
- The high percentage of bookings with special requests (49.67%) suggests that guests value personalized services.

4. Revenue Drivers:

- **City Hotels** and **Online TA** bookings were the primary drivers of revenue.
- The **BB** meal plan was the most popular, contributing significantly to revenue.

5. Geographic Insights:

- The majority of guests were from **Portugal (PRT)**, indicating a strong domestic market. The UK (GBR) and France (FRA) were also significant sources of international guests.

6. Customer Loyalty:

- The low percentage of returning guests (3.87%) suggests a need for improved customer retention strategies.

Conclusion:

The analysis reveals that **City Hotels** dominate the market in terms of bookings and revenue, with Online Travel Agents being the most popular booking channel. Seasonal trends show a clear peak in summer months, while cancellations are more prevalent in City Hotels. Guest preferences lean towards shorter stays, room type **A**, and the **BB** meal plan. The low percentage of returning guests highlights an opportunity for hotels to enhance customer loyalty programs. Overall, the data provides actionable insights for optimizing hotel operations, improving guest satisfaction, and driving revenue growth.

Recommendations for Optimization and Growth

1. Optimize Pricing and Promotions During Peak and Off-Peak Seasons

- **Summer Months (July & August)**: Since these months generate the highest revenue, consider implementing dynamic pricing strategies to maximize revenue during peak demand.
- **Off-Peak Months (November & December)**: Offer special promotions, discounts, or packages to attract more guests during these periods. For example, create holiday-themed packages or partner with local events to drive bookings.

2. Reduce Cancellation Rates

- **City Hotels**: Given the higher cancellation rates (36.75%), consider implementing stricter cancellation policies or offering incentives for non-cancellable bookings (e.g., discounts or free upgrades).
- **Flexible Booking Options**: For Resort Hotels, which have lower cancellation rates, continue to offer flexible booking options to attract leisure travelers who may need more flexibility.

3. Enhance Guest Experience with Special Requests

- Since **49.67%** of bookings included special requests, ensure that the hotel staff is well-trained to handle and fulfill these requests efficiently.
- Consider offering a wider range of personalized services (e.g., pillow menus, room customization options) to cater to guest preferences and improve satisfaction.

4. Focus on Room Type Preferences

- **Room Type A**: Given its popularity, ensure that this room type is always well-maintained and available. Consider increasing the number of Room Type A units if possible.
- **Room Type D**: As the second most popular room type, ensure that it is also well-stocked and marketed effectively.

5. Improve Customer Retention

- **Loyalty Programs**: With only **3.87%** of guests being returning customers, implement a robust loyalty program to encourage repeat visits. Offer rewards such as free nights, room upgrades, or exclusive discounts for returning guests.
- **Personalized Marketing**: Use guest data to send personalized offers and communications (e.g., birthday discounts, anniversary packages) to encourage repeat bookings.

6. Target Key Markets

- **Domestic Market (Portugal)**: Continue to focus on the domestic market, which accounts for **33.37%** of bookings. Tailor marketing campaigns to local preferences and events.

- **International Markets (UK, France, Spain)**: Increase marketing efforts in these countries, especially during their peak travel seasons. Consider offering packages that cater to international guests, such as airport transfers or multilingual services.

7. Optimize Distribution Channels

- **Online Travel Agents (OTAs)**: Since **58.85%** of bookings come through OTAs, maintain strong relationships with these platforms and ensure that your hotel is prominently featured.
- **Direct Bookings**: Encourage more direct bookings by offering exclusive perks (e.g., free breakfast, late checkout) for guests who book directly through the hotel's website.

8. Enhance Meal Plan Offerings

- **Bed & Breakfast (BB)**: Since **77.87%** of guests choose the BB meal plan, ensure that the breakfast offering is of high quality and variety. Consider adding local or seasonal dishes to enhance the experience.
- **Half Board (HB)**: Promote the HB meal plan more aggressively, especially for longer stays, by highlighting the convenience and value it offers.

9. Parking Facilities

- **Parking Demand**: With **8.24%** of guests requiring parking, ensure that parking facilities are adequate and well-maintained. Consider offering valet parking or reserved parking spots for an additional fee.

10. Focus on Short Stays

- **2-3 Night Stays**: Since **38.28%** of bookings are for 2-3 nights, create packages tailored to short stays, such as weekend getaways or midweek breaks, with added perks like dining discounts.

الحمد لله بهذا أكون قد انهيت هذا المشروع

"شكرًا لك على تخصيص الوقت لمراجعة هذا المشروع. إن تعليقاتك وأفكارك محل تقدير دائمًا. أتمنى لك النجاح المستمر وكل التوفيق في مساعيك!"