

Data and Artificial Intelligence

Cyber Shujaa Program

Week 4 Assignment

Business Intelligence with Power BI – Hotel Management

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Introduction

This assignment focuses on developing **hands-on experience in Business Intelligence using Power BI** for a **Hotel Management** business scenario.

The goal was to analyze and visualize hotel booking and revenue data to gain actionable insights into **occupancy trends, customer preferences, and performance metrics** that support data-driven decisions.

The project objectives were to:

- Understand the hotel business structure and client needs.
- Load, clean, and transform datasets in Power BI.
- Build a **star schema data model** linking dimensions and fact tables.
- Create **DAX measures** for key performance indicators (KPIs).
- Develop an **interactive dashboard** to communicate insights effectively.
- Publish the report to the **Power BI Service** and include it in the project portfolio.

Tasks Completed

Data Loading and Transformation

Datasets Used:

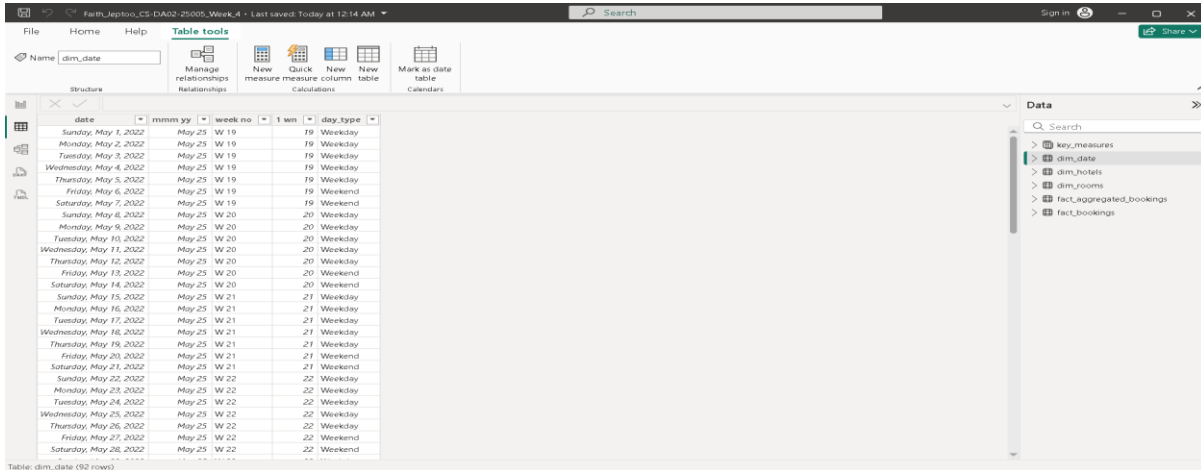
- **dim_date.csv** – calendar data for dates and periods.
- **dim_rooms.csv** – room categories, capacity, and pricing.
- **fact_bookings.csv** – booking transactions, customer details, and revenue.
- **dim_customers.csv** – customer demographics and booking sources.

Data Preparation Steps:

1. Imported all datasets into Power BI using **Get Data → CSV**.
2. Performed transformations in **Power Query Editor**, including:
 - Renaming columns for consistency.
 - Removing null or duplicate records.
 - Changing data types (dates, currency, integers).

- Merging datasets for additional attributes (e.g., combining bookings with room details).

3. Created **calculated columns** such as “Length of Stay” and “Total Revenue.”



date	mmm yy	week no	1 wn	day_type
Sunday, May 1, 2022	May 25	W 19	19	Weekday
Monday, May 2, 2022	May 25	W 19	19	Weekday
Tuesday, May 3, 2022	May 25	W 19	19	Weekday
Wednesday, May 4, 2022	May 25	W 19	19	Weekday
Thursday, May 5, 2022	May 25	W 19	19	Weekend
Friday, May 6, 2022	May 25	W 19	19	Weekend
Saturday, May 7, 2022	May 25	W 19	19	Weekday
Sunday, May 8, 2022	May 25	W 20	20	Weekday
Monday, May 9, 2022	May 25	W 20	20	Weekday
Tuesday, May 10, 2022	May 25	W 20	20	Weekday
Wednesday, May 11, 2022	May 25	W 20	20	Weekday
Thursday, May 12, 2022	May 25	W 20	20	Weekend
Friday, May 13, 2022	May 25	W 20	20	Weekend
Saturday, May 14, 2022	May 25	W 20	20	Weekday
Sunday, May 15, 2022	May 25	W 21	21	Weekday
Monday, May 16, 2022	May 25	W 21	21	Weekday
Tuesday, May 17, 2022	May 25	W 21	21	Weekday
Wednesday, May 18, 2022	May 25	W 21	21	Weekday
Thursday, May 19, 2022	May 25	W 21	21	Weekend
Friday, May 20, 2022	May 25	W 21	21	Weekend
Saturday, May 21, 2022	May 25	W 22	22	Weekday
Sunday, May 22, 2022	May 25	W 22	22	Weekday
Monday, May 23, 2022	May 25	W 22	22	Weekday
Tuesday, May 24, 2022	May 25	W 22	22	Weekday
Wednesday, May 25, 2022	May 25	W 22	22	Weekday
Thursday, May 26, 2022	May 25	W 22	22	Weekend
Friday, May 27, 2022	May 25	W 22	22	Weekend
Saturday, May 28, 2022	May 25	W 22	22	Weekend

Building the Data Model (Star Schema)

A **star schema** model was designed to simplify analysis and relationships:

Fact Table:

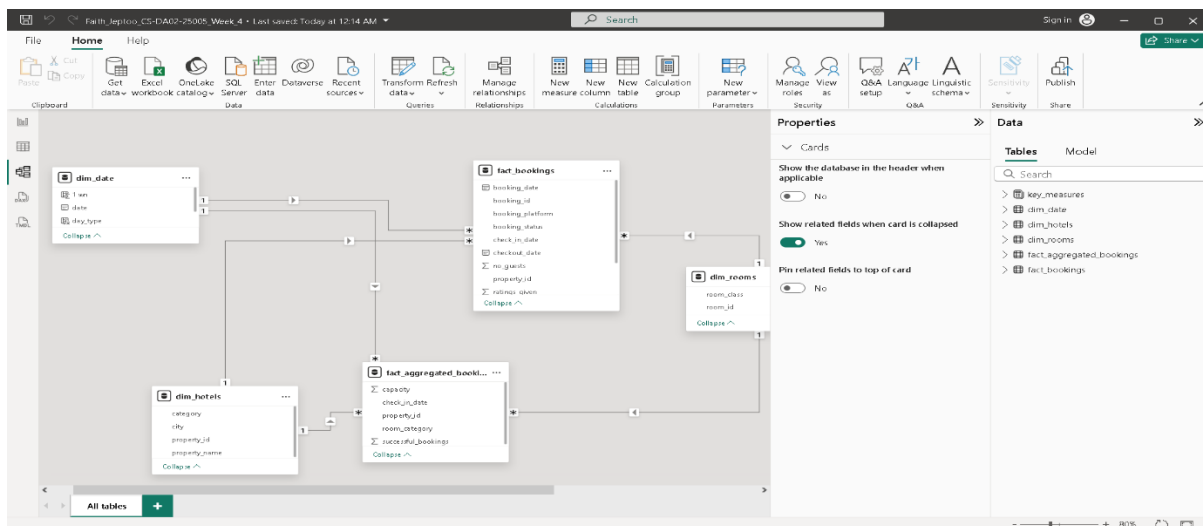
- fact_bookings (contains transactional data like revenue, booking date, room ID, customer ID)

Dimension Tables:

- dim_date → linked via BookingDate
- dim_rooms → linked via RoomID
- dim_customers → linked via CustomerID

Relationships:

- One-to-Many relationships between dimensions and fact tables.
- Referential integrity enforced to ensure accurate joins.



Creating DAX Calculations

Several **DAX measures** were created to analyze performance metrics.

Below is an example of Realisation WoW Change %:

The screenshot shows the Power BI Desktop interface with the 'Measure tools' ribbon active. The 'Name' field is set to 'Realisation WoW Change %'. The 'Format' dropdown is set to 'General'. The 'Data category' is set to 'Uncategorized'. The 'Structure' pane shows the 'key_measures' table. The 'Data' pane shows the 'key_measures' table with various measures listed, including 'Realisation WoW change %'.

```
1 Realisation WoW change % =  
2 var selv = IF(WASONEFILTER(dim_date[1 wn]),SELECTEDVALUE(dim_date[1 wn]),MAX(dim_date[1 wn]))  
3 var revcur = CALCULATE([Realisation %],dim_date[1 wn]= selv)  
4 var revpwr = CALCULATE([Realisation %],FILTER(ALL(dim_date),dim_date[1 wn]= selv-1))  
5  
6 return  
7  
8  
9 DIVIDE(revcur,revpwr,0)-1
```

Table: key_measures (0 rows)

Dashboard Design and Visualization

The screenshot shows a Power BI dashboard with the following components:

- Filters:** Filter by City (AB), Filter by Room Type (AB), Filter by Room Type (AB).
- Summary Cards:** Revenue (1.69bn), RevPAR (7,337), DSRN (2,528), Occupancy % (57.79%), ADR (12,70K), Realisation % (70.14%).
- Visualizations:** % Revenue by category (Donut chart), Trend By Key Matrix (Line chart), Realisation % and ADR by booking platform (Line chart).
- Data Table:** A table showing property details, revenue, bookings, and various performance metrics.

property_id	property_name	city	Revenue	Total Bookings	RevPAR	Occupancy %	ADR	DSRN	DSRN	DSRN	DSRN	Realisation %	Cancellation %	Average fur
16519	Atlas Etica	Mumbai	7251	10629	65.85%	14,141	121	80	56	103.9%	24.63%			
185162	Atlas Bay	Hyderabad	7246	6216	69.81%	9,446	121	80	56	103.20%	24.68%			
165163	Atlas Palace	Delhi	7054	8,269	66.25%	12,480	117	79	54	100.2%	25.19%			
185160	Atlas City	Hyderabad	6953	6,046	66.07%	9,185	109	72	51	103.9%	24.13%			
185161	Atlas Blu	Hyderabad	6734	5,679	65.46%	8,676	107	70	49	103.36%	24.27%			
175163	Atlas Palace	Mumbai	6259	10,592	66.13%	14,016	104	69	49	104.6%	24.38%			
175159	Atlas Etica	Mumbai	6214	10,107	66.09%	15,239	101	67	47	108.1%	24.04%			
175160	Atlas City	Mumbai	5940	7,763	53.07%	14,629	123	85	45	89.51%	25.12%			
195160	Atlas City	Bangalore	5904	8,965	65.33%	13,860	99	65	45	69.02%	26.48%			
195162	Atlas Bay	Bangalore	5736	9,312	65.66%	14,183	96	61	44	104.4%	24.39%			
195161	Atlas Blu	Bangalore	5669	6,774	53.25%	12,722	117	42	41	69.80%	24.64%			
195163	Atlas Palace	Bangalore	5347	6,740	53.42%	12,470	110	59	41	69.50%	25.38%			
185159	Atlas Etica	Hyderabad	5190	4,261	44.37%	8,111	128	57	40	103.7%	24.33%			
175161	Atlas Blu	Mumbai	5130	9,447	66.19%	14,271	85	56	39	101.4%	24.41%			
175158	Atlas Grand	Mumbai	4975	7,953	53.40%	14,939	102	55	38	69.91%	25.47%			
165162	Atlas Bay	Delhi	4762	6,254	53.40%	13,712	86	52	36	69.34%	25.24%			
165160	Atlas City	Delhi	4635	6,281	53.67%	13,714	95	51	36	71.20%	24.01%			
195159	Atlas Etica	Bangalore	4645	6,951	53.73%	12,751	95	51	36	102.6%	24.54%			
195163	Atlas Palace	Bangalore	4645	6,951	53.73%	12,751	95	51	36	102.6%	24.54%			
Total			58884	132,919	7,337	57.79%	12,496	2,528	1,661	1,005	70.14%	24.64%		

Conclusion

This project demonstrated the complete **Business Intelligence workflow** using Power BI — from data ingestion and modeling to interactive visualization.

The final dashboard provides hotel managers with valuable insights into:

- **Revenue and occupancy performance.**
- **Customer behavior and booking patterns.**
- **Trends that influence profitability.**

Power BI proved to be a powerful tool for **data-driven decision-making** in the hospitality industry.

Link To Notebook

<https://drive.google.com/file/d/1Z8R9eZqT08Yxk37UkoJzFCfmDInBH1G9/view?usp=sharing>