



# **The University of Newcastle, Australia**

*SCHOOL OF INFORMATION AND PHYSICAL SCIENCES*

COMP3350 – Advanced Database

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## **Introduction**

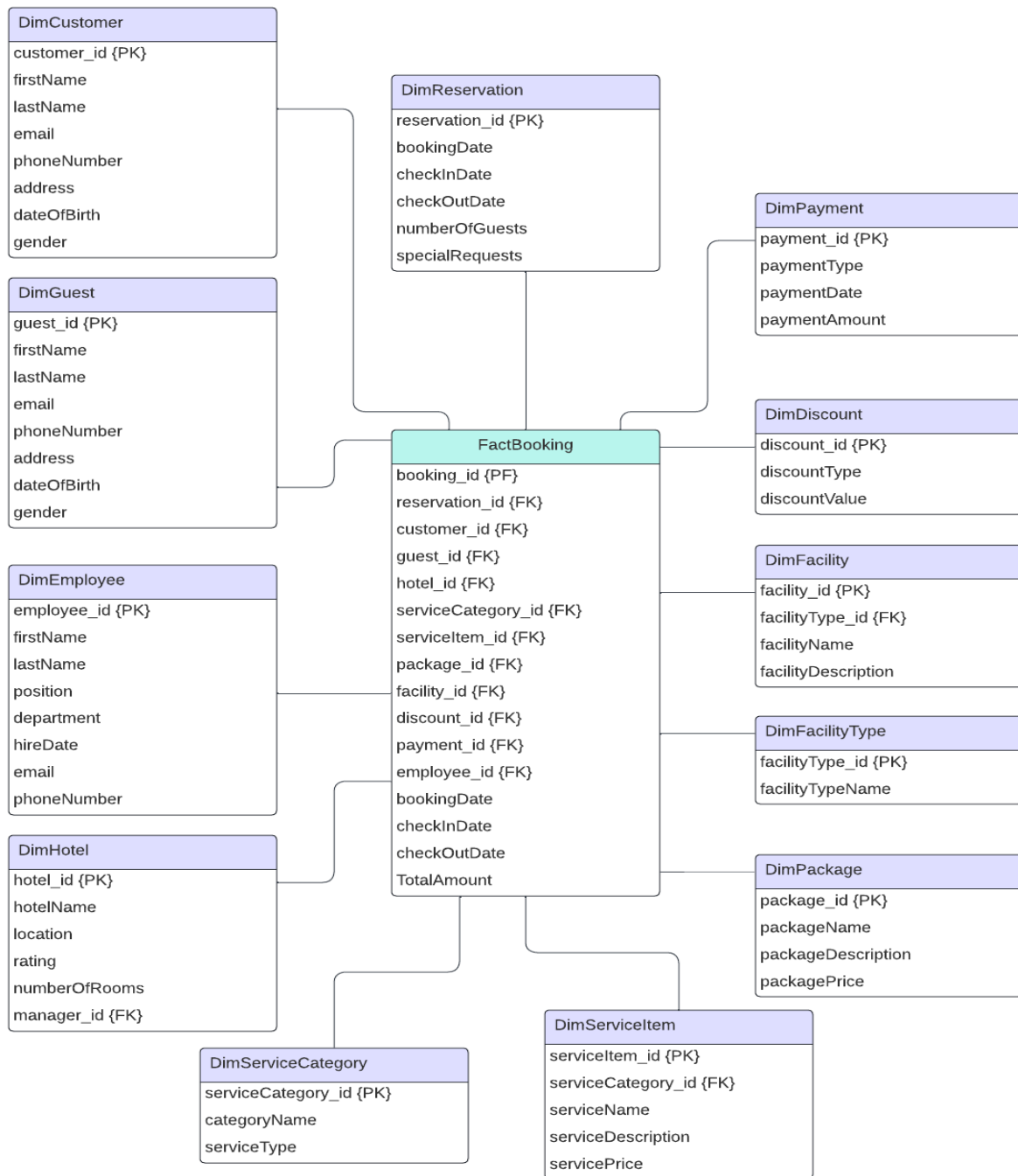
This report outlines the design of a data warehouse schema for LeisureAustralasia, a group operating hotels and resorts throughout Australia and Asia. The schema is designed to meet the decision-makers' information needs, facilitating strategic decision-making and operational efficiency.

## **Subjects covered within the data warehouse**

1. Reservations; The category is home to the specifics surrounding booking — dates, guest count, and any peculiar requests outlined by those seeking accommodation.
2. Customers; This is where details on clients are kept— along with how they can be reached, allowing easy customer segmentation for targeted marketing efforts.
3. Guests; A wealth of details resides here: guest specifics. Pulling from this resource can not only enrich a guest's stay but also aid in crafting programs that inspire loyalty from them as well.
4. Employees; This category holds employee details that're useful for managing staff and analyzing their performance.
5. Hotel; Data contained helps in effective management by providing detailed locations, ratings and capacity sizes for properties that can be used for comparison analysis.
6. Services; Details are organized into different groups which make it easier to identify what a specific category entails along with cost.
7. Packages; Information on packages is available here which proves beneficial for sales analysis and marketing strategies.
8. Facilities; Details regarding hotel facilities are stored here along with types of facilities to support asset management and analyze guest satisfaction levels.
9. Discounts; This category keeps track of types of discounts offered along with their values which're crucial for revenue analysis and evaluating promotional effectiveness.
10. Payments; Records related to payment details are stored here to assist in analysis well as detecting any fraudulent activities.

## Data Warehouse Schema

The architecture of this data warehouse is star schema, with several dimension tables linked to an essential FactBooking table. Reservations, clients, visitors, workers, hotels, packages, services, amenities, discounts, and payments are the main topics of discussion.



## **Achieving Analytical Requirements**

The data warehouse fulfills the demands of the organization by serving as a complete data repository that enables various forms of analysis to be completed.

### **1. Operational Efficiency**

Monitoring daily operations, including staff performance indicators, service usage information, and occupancy rates.

### **2. Insight on Client Behavior**

We can make sure that our marketing plans are geared toward the happiness and satisfaction of our customers by using analysis to examine client specifics and preferences.

### **3. Evaluation of Financial Health**

Analyzing revenue streams, cost management, and profitability using detailed payment and discount data.

### **4. Facility and Service Management**

Evaluating the effectiveness and use of facilities and services in order to improve offerings and increase visitor fulfillment.

### **5.Strategic Planning Support**

Provides information on market trends, competitor positioning, and future planning to support decision-making processes.

## How the Data Warehouse Satisfies Information Analysis Needs

For LeisureAustralasia's data, the data warehouse acts as a centralized storage space that enables in-depth analysis. It satisfies the needs of the business in terms of comprehending effectiveness customer, habits, financial outcomes, and service oversight.

### 1.Occupancy Rate Analysis by Hotel

```
SQLQuery1.sql - LA...CTEV8P\thetp (76))*  X
SELECT
    H.HotelName,
    COUNT(B.BookingID) AS TotalBookings,
    AVG(DATEDIFF(DAY, B.CheckInDate, B.CheckOutDate)) AS AverageStay
FROM
    FactBooking B
JOIN
    DimHotel H ON B.HotelID = H.HotelID
WHERE
    B.BookingDate BETWEEN '2023-01-01' AND '2023-12-31'
GROUP BY
    H.HotelName;
```

Explanation: This analysis query calculates the total bookings and average stay duration per hotel over the past year

### 2.Revenue by Service Category

```
SQLQuery1.sql - LA...CTEV8P\thetp (76))*  X
SELECT
    SC.CategoryName,
    SUM(B.TotalAmount) AS TotalRevenue
FROM
    FactBooking B
JOIN
    DimServiceCategory SC ON B.ServiceCategoryID = SC.ServiceCategoryID
GROUP BY
    SC.CategoryName;
```

Explanation: This analysis query sum up the total revenue generated from each service category

### 3.Customer Spending Analysis

```
SQLQuery1.sql - LA...CTEV8P\thetp (76))*  X
SELECT
    C.CustomerType,
    COUNT(B.CustomerID) AS TotalCustomers,
    AVG(B.TotalAmount) AS AverageSpending
FROM
    FactBooking B
JOIN
    DimCustomer C ON B.CustomerID = C.CustomerID
GROUP BY
    C.CustomerType;
```

Explanation: This query classifies customers by type and determines their average expenditure

### 4.Employee Performance Analysis

```
SQLQuery1.sql - LA...CTEV8P\thetp (76))*  X
SELECT
    E.FirstName + ' ' + E.LastName AS EmployeeName,
    COUNT(B.BookingID) AS TotalBookingsHandled,
    SUM(B.TotalAmount) AS TotalRevenueGenerated
FROM
    FactBooking B
JOIN
    DimEmployee E ON B.EmployeeID = E.EmployeeID
GROUP BY
    E.FirstName, E.LastName;
```

Explanation: This query evaluates employee performance based on the number of bookings handled and total revenue generated.

## 5. Effectiveness of Promotional Discounts

```
SQLQuery1.sql - LA...CTEV8P\thetp (76))*  [X]
SELECT
    D.DiscountType,
    COUNT(B.BookingID) AS TotalBookings,
    SUM(B.TotalAmount) AS TotalRevenue
FROM
    FactBooking B
JOIN
    DimDiscount D ON B.DiscountID = D.DiscountID
GROUP BY
    D.DiscountType;
```

Explanation: This query measures the effectiveness of various discounts based on the number of bookings and total revenue

## Created fact and dimension tables

```
SQLQuery1.sql - LA...TEV8P\thetp (129))*  [X]
-- Create Dimension Tables
CREATE TABLE DimReservation (
    ReservationID INT PRIMARY KEY,
    BookingDate DATE,
    CheckInDate DATE,
    CheckOutDate DATE,
    NumberOfGuests INT,
    SpecialRequests VARCHAR(255)
);

CREATE TABLE DimCustomer (
    CustomerID INT PRIMARY KEY,
    FirstName VARCHAR(50),
    LastName VARCHAR(50),
    Email VARCHAR(100),
    Phone VARCHAR(20),
    Address VARCHAR(255),
    DateOfBirth DATE,
    CustomerType VARCHAR(50)
);

CREATE TABLE DimGuest (
    GuestID INT PRIMARY KEY,
    FirstName VARCHAR(50),
    LastName VARCHAR(50),
    DateOfBirth DATE,
    Gender VARCHAR(10),
    Email VARCHAR(100),
    Phone VARCHAR(20),
    CustomerID INT,
    FOREIGN KEY (CustomerID) REFERENCES DimCustomer(CustomerID)
);

CREATE TABLE DimEmployee (
    EmployeeID INT PRIMARY KEY,
    FirstName VARCHAR(50),
    LastName VARCHAR(50),
    Position VARCHAR(50),
    Department VARCHAR(50),
    HireDate DATE,
    Email VARCHAR(100),
    Phone VARCHAR(20)
);
```



```

CREATE TABLE DimHotel (
    HotelID INT PRIMARY KEY,
    HotelName VARCHAR(100),
    Location VARCHAR(100),
    Rating INT,
    NumberOfRooms INT,
    ManagerID INT,
    FOREIGN KEY (ManagerID) REFERENCES DimEmployee(EmployeeID)
);

CREATE TABLE DimServiceCategory (
    ServiceCategoryID INT PRIMARY KEY,
    CategoryName VARCHAR(50)
);

CREATE TABLE DimServiceItem (
    ServiceItemID INT PRIMARY KEY,
    ServiceCategoryID INT,
    ServiceName VARCHAR(50),
    ServiceDescription VARCHAR(255),
    ServicePrice DECIMAL(10, 2),
    FOREIGN KEY (ServiceCategoryID) REFERENCES DimServiceCategory(ServiceCategoryID)
);

CREATE TABLE DimPackage (
    PackageID INT PRIMARY KEY,
    PackageName VARCHAR(50),
    PackageDescription VARCHAR(255),
    PackagePrice DECIMAL(10, 2)
);

CREATE TABLE DimFacilityType (
    FacilityTypeID INT PRIMARY KEY,
    FacilityTypeName VARCHAR(50)
);

CREATE TABLE DimFacility (
    FacilityID INT PRIMARY KEY,
    FacilityTypeID INT,
    FacilityName VARCHAR(50),
    FacilityDescription VARCHAR(255),
    FOREIGN KEY (FacilityTypeID) REFERENCES DimFacilityType(FacilityTypeID)
);

```

```

CREATE TABLE DimDiscount (
    DiscountID INT PRIMARY KEY,
    DiscountType VARCHAR(50),
    DiscountValue DECIMAL(5, 2)
);

CREATE TABLE DimPayment (
    PaymentID INT PRIMARY KEY,
    PaymentType VARCHAR(50),
    PaymentDate DATE,
    PaymentAmount DECIMAL(10, 2)
);

-- Create Fact Table
CREATE TABLE FactBooking (
    BookingID INT PRIMARY KEY,
    ReservationID INT,
    CustomerID INT,
    GuestID INT,
    HotelID INT,
    ServiceCategoryID INT,
    ServiceItemID INT,
    PackageID INT,
    FacilityID INT,
    DiscountID INT,
    PaymentID INT,
    EmployeeID INT,
    BookingDate DATE,
    CheckInDate DATE,
    CheckOutDate DATE,
    TotalAmount DECIMAL(10, 2),
    FOREIGN KEY (ReservationID) REFERENCES DimReservation(ReservationID),
    FOREIGN KEY (CustomerID) REFERENCES DimCustomer(CustomerID),
    FOREIGN KEY (GuestID) REFERENCES DimGuest(GuestID),
    FOREIGN KEY (HotelID) REFERENCES DimHotel(HotelID),
    FOREIGN KEY (ServiceCategoryID) REFERENCES DimServiceCategory(ServiceCategoryID),
    FOREIGN KEY (ServiceItemID) REFERENCES DimServiceItem(ServiceItemID),
    FOREIGN KEY (PackageID) REFERENCES DimPackage(PackageID),
    FOREIGN KEY (FacilityID) REFERENCES DimFacility(FacilityID),
    FOREIGN KEY (DiscountID) REFERENCES DimDiscount(DiscountID),
    FOREIGN KEY (PaymentID) REFERENCES DimPayment(PaymentID),
    FOREIGN KEY (EmployeeID) REFERENCES DimEmployee(EmployeeID)
);

```

## Sample data to test the queries

```

-- Inserting Sample Data to test the queries
INSERT INTO DimReservation VALUES (1, '2023-06-01', '2023-06-10', '2023-06-15', 2, 'Late check-in');
INSERT INTO DimCustomer VALUES (1, 'John', 'Doe', 'john.doe@example.com', '1234567890', '123 Elm St', '1980-01-01', 'Individual');
INSERT INTO DimGuest VALUES (1, 'Jane', 'Doe', '2000-05-05', 'Female', 'jane.doe@example.com', '0987654321', 1);
INSERT INTO DimEmployee VALUES (1, 'Alice', 'Smith', 'Manager', 'Front Office', '2010-02-15', 'alice.smith@example.com', '1122334455');
INSERT INTO DimHotel VALUES (1, 'Grand Hotel', 'Sydney', 5, 100, 1);
INSERT INTO DimServiceCategory VALUES (1, 'Spa');
INSERT INTO DimServiceItem VALUES (1, 1, 'Full Body Massage', 'Relaxing full body massage', 100.00);
INSERT INTO DimPackage VALUES (1, 'Romantic Getaway', 'Couple package with spa and dinner', 500.00);
INSERT INTO DimFacilityType VALUES (1, 'Pool');
INSERT INTO DimFacility VALUES (1, 1, 'Infinity Pool', 'Outdoor infinity pool with ocean view');
INSERT INTO DimDiscount VALUES (1, 'Summer Sale', 20.00);
INSERT INTO DimPayment VALUES (1, 'Credit Card', '2023-06-15', 1200.00);

INSERT INTO FactBooking VALUES (1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, '2023-06-01', '2023-06-10', '2023-06-15', 1200.00);

-- Sample data for additional bookings and services
INSERT INTO DimReservation VALUES (2, '2023-07-01', '2023-07-05', '2023-07-10', 3, 'Allergic to nuts');
INSERT INTO DimCustomer VALUES (2, 'Bob', 'Johnson', 'bob.johnson@example.com', '2233445566', '456 Oak St', '1975-02-15', 'Corporate');
INSERT INTO DimGuest VALUES (2, 'Tom', 'Johnson', '2010-09-15', 'Male', 'tom.johnson@example.com', '6677889900', 2);
INSERT INTO DimEmployee VALUES (2, 'David', 'Williams', 'Receptionist', 'Front Office', '2015-06-01', 'david.williams@example.com', '9988776655');
INSERT INTO DimHotel VALUES (2, 'Beach Resort', 'Gold Coast', 4, 150, 2);
INSERT INTO DimServiceCategory VALUES (2, 'Gym');
INSERT INTO DimServiceItem VALUES (2, 2, 'Personal Training', 'One-on-one training session', 50.00);
INSERT INTO DimPackage VALUES (2, 'Family Fun', 'Family package with activities for kids', 800.00);
INSERT INTO DimFacilityType VALUES (2, 'Gym');
INSERT INTO DimFacility VALUES (2, 2, 'Fitness Center', 'State-of-the-art fitness center');
INSERT INTO DimDiscount VALUES (2, 'Winter Sale', 15.00);
INSERT INTO DimPayment VALUES (2, 'Debit Card', '2023-07-10', 1600.00);

INSERT INTO FactBooking VALUES (2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, '2023-07-01', '2023-07-05', '2023-07-10', 1600.00);

```

## **Conclusion**

The LeisureAustralasia structured data warehouse layout provides an orderly, comprehensive, and unified data repository, effectively meeting the organization's information analysis needs. This configuration supports well-informed decision-making and strategic planning projects by facilitating analyses ranging from efficiency to financial outcomes.