ISIT312 A2 Task 1

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Dimensions:

1. Manufacturer
2. Model
3. Bus
4. Driver
5. Depot
6. Trip
7. Segment
8. Time

Hierarchy:

1. City → Depot
2. Manufacturer → Model → Bus
3. Year → Month → Day
4. Trip → segment

Fact table: BUSTRIPINFO

Facts & measures:

1. Total Kilometers Traveled (**DistanceTraveled**): Sum of segment lengths that a bus has traveled within a specific time period. Derived by summing the length of segments for each bus per day, month, and year.

```
SELECT
    b.BusID,
    t.Year,
    t.Month,
    t.Day,
```

```
    SUM(s.length) AS DistanceTraveled
  FROM
    BUSTRIPINFO bi
  JOIN
    Segment s ON bi.SegmentID = s.SegmentID
  JOIN
    Bus b ON bi.BusID = b.BusID
  JOIN
    Time t ON bi.DateID = t.DateID
  GROUP BY
    b.BusID, t.Year, t.Month, t.Day;
```

2. Total Number of Trips (**TripCountByBusDriver**): Count of trips completed by each bus, driver, per day, month, and year. This can be derived by counting unique trips for each bus and driver within each time frame.

```
SELECT
  b.BusID,
  d.DriverID,
  t.Year,
  t.Month,
  t.Day,
  COUNT(DISTINCT bi.TripID) AS TripCountByBusDriver
FROM
  BUSTRIPINFO bi
JOIN
  Bus b ON bi.BusID = b.BusID
JOIN
  Driver d ON bi.DriverID = d.DriverID
```

```
JOIN
  Time t ON bi.DateID = t.DateID
GROUP BY
  b.BusID, d.DriverID, t.Year, t.Month, t.Day;
```

3. Total Number of Drivers per Trip (**DriverCount**): Count of unique drivers assigned to each trip.

```
SELECT
  bi.TripID,
  COUNT(DISTINCT bi.DriverID) AS DriverCount
FROM
  BUSTRIPINFO bi
GROUP BY
  bi.TripID;
```

4. Total Buses per Segment (**BusCount**): Count of buses that have traveled through each segment, per trip, per day, month, and year.

```
SELECT
  bi.SegmentID,
  bi.TripID,
  t.Year,
  t.Month,
  t.Day,
  COUNT(DISTINCT bi.BusID) AS BusCount
FROM
  BUSTRIPINFO bi
JOIN
```

```
  Time t ON bi.DateID = t.DateID
GROUP BY
  bi.SegmentID, bi.TripID, t.Year, t.Month, t.Day;
```

5. Average Duration of Bus Travel (**AvgTravelDuration**): Calculated as the average time spent by buses on each segment per trip, aggregated over day, month, and year.

```
  SELECT
    bi.SegmentID,
    bi.TripID,
    t.Year,
    t.Month,
    t.Day,
    AVG(DATEDIFF(SECOND, bi.SegmentStartTime, bi.SegmentEndTime)) AS
AvgTravelDuration
  FROM
    BUSTRIPINFO bi
  JOIN
    Time t ON bi.DateID = t.DateID
  GROUP BY
    bi.SegmentID, bi.TripID, t.Year, t.Month, t.Day
```

6. Total Fuel Consumption (**FuelConsumed**): Sum of fuel consumption per trip segment, calculated for each trip, bus model, manufacturer, and by day, month, and year.

```
SELECT
  bi.SegmentID,
```

```
    bi.TripID,
    m.ModelID,
    mf.ManufacturerID,
    t.Year,
    t.Month,
    t.Day,
    SUM(bi.FuelConsumed) AS FuelConsumed
FROM
    BUSTRIPINFO bi
JOIN
    Bus b ON bi.BusID = b.BusID
JOIN
    Model m ON b.ModelID = m.ModelID
JOIN
    Manufacturer mf ON m.ManufacturerID = mf.ManufacturerID
JOIN
    Time t ON bi.DateID = t.DateID
GROUP BY
    bi.SegmentID, bi.TripID, m.ModelID, mf.ManufacturerID, t.Year, t.Month, t.Day;
```

7. **Total Number of Trips per Bus, per Depot, per City (TripCountByDepotCity)**: Count of trips per bus, grouped by the depot and city to which the bus is assigned. This can be derived by counting trips for each unique combination of bus, depot, and city.

```
SELECT
    b.BusID,
    dpt.DepotID,
```

```
  dpt.City,
  COUNT(DISTINCT bi.TripID) AS TripCountByDepotCity
FROM
  BUSTRIPINFO bi
JOIN
  Bus b ON bi.BusID = b.BusID
JOIN
  Depot dpt ON b.DepotID = dpt.DepotID
GROUP BY
  b.BusID, dpt.DepotID, dpt.City;
```

8. Total Passengers per Segment (**PassengerCount**): Count of passengers for each segment within a trip, over time.

```
SELECT
  bi.SegmentID,
  bi.TripID,
  t.Year,
  t.Month,
  t.Day,
  SUM(bi.PassengerCount) AS Passengercount
FROM
  BUSTRIPINFO bi
JOIN
  Time t ON bi.DateID = t.DateID
GROUP BY
  bi.SegmentID, bi.TripID, t.Year, t.Month, t.Day;
```

9. Maximum Passengers per Bus (**MaxPassengers**): Maximum number of passengers recorded on a bus for a trip.

```
SELECT
  bi.BusID,
  bi.TripID,
  MAX(bi.PassengerCount) AS MaxPassengers
FROM
  BUSTRIPINFO bi
GROUP BY
  bi.BusID, bi.TripID;
```

10. Average Passengers per Trip (**AvgPassengers**): Average number of passengers across all segments within each trip.

```
SELECT
  bi.TripID,
  AVG(bi.PassengerCount) AS AvgPassengers
FROM
  BUSTRIPINFO bi
GROUP BY
  bi.TripID;
```