**Report**

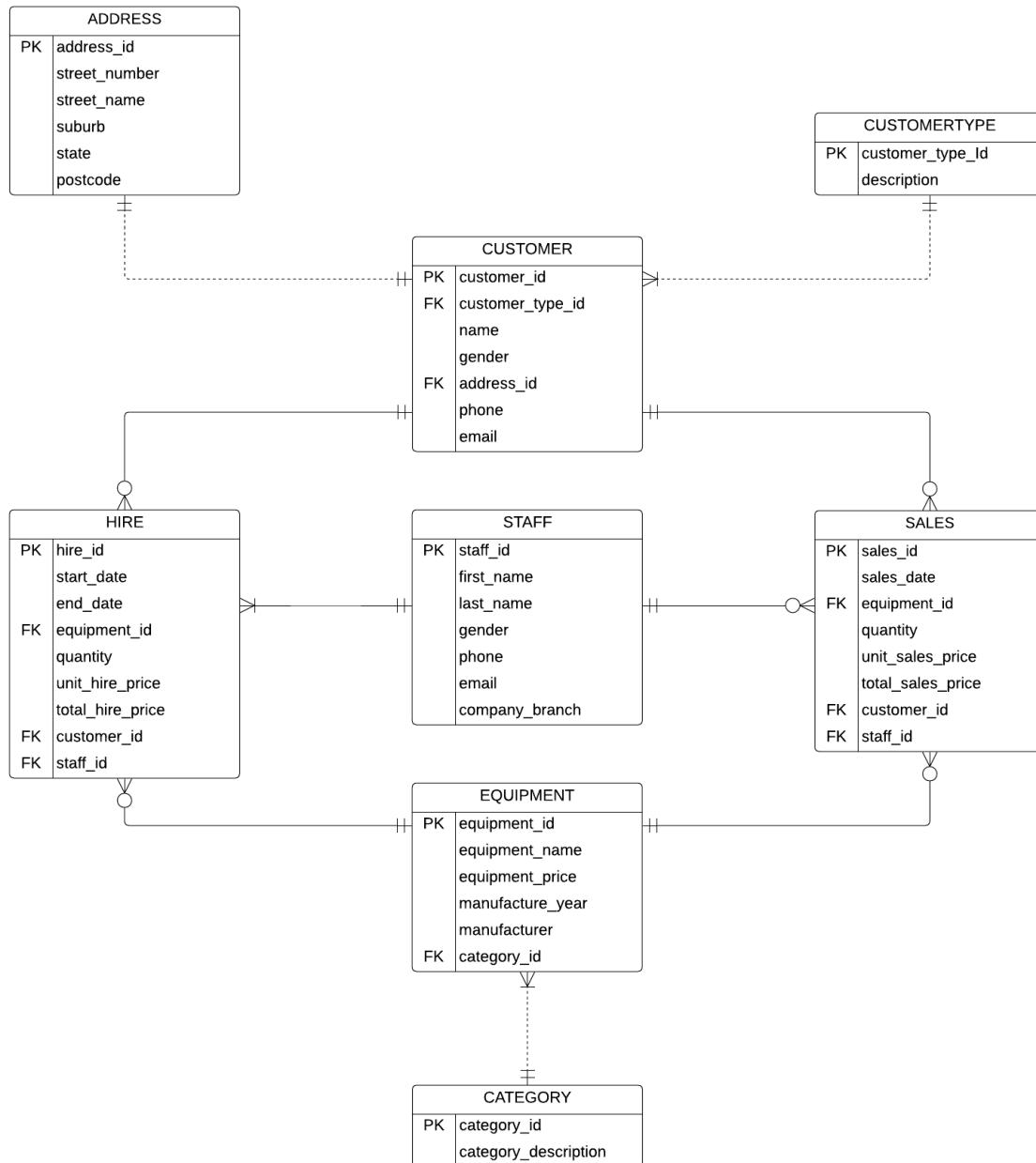**FIT3003 – Business Intelligence and Data Warehousing**



**Team:**

**Agung Ratana Jayo Silim (32805942)**
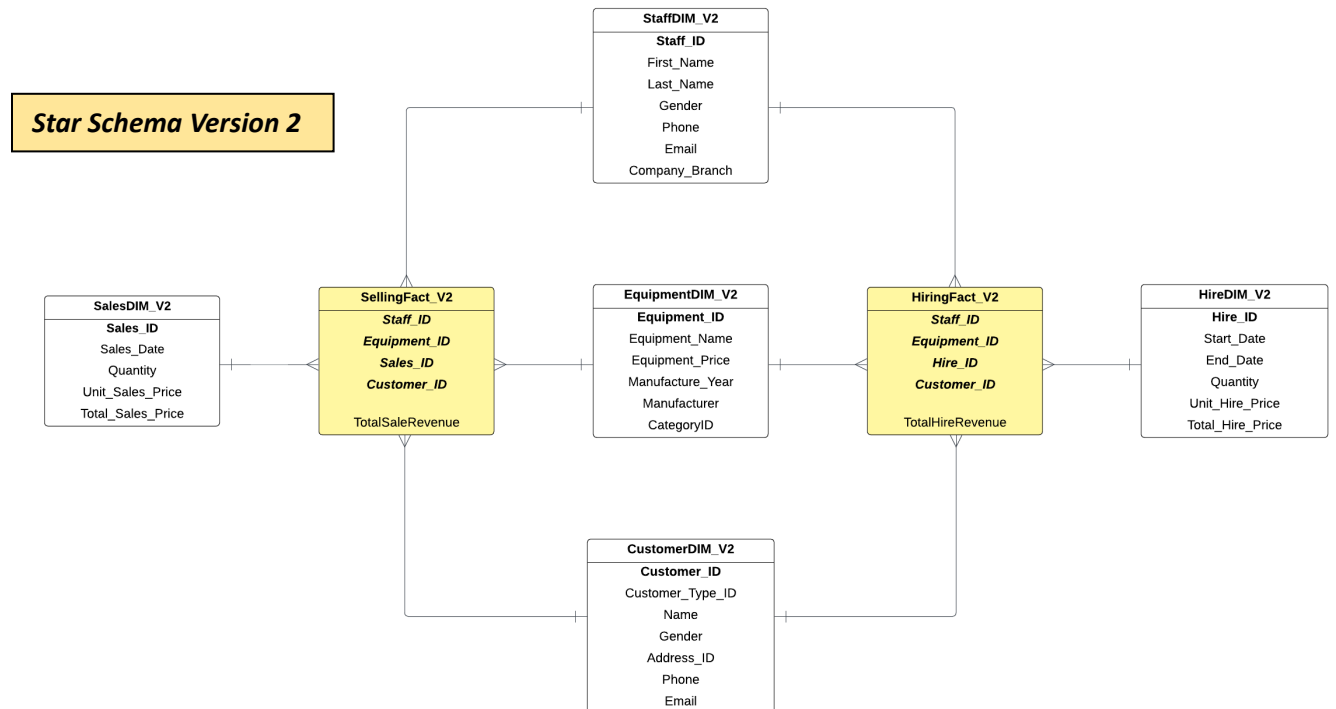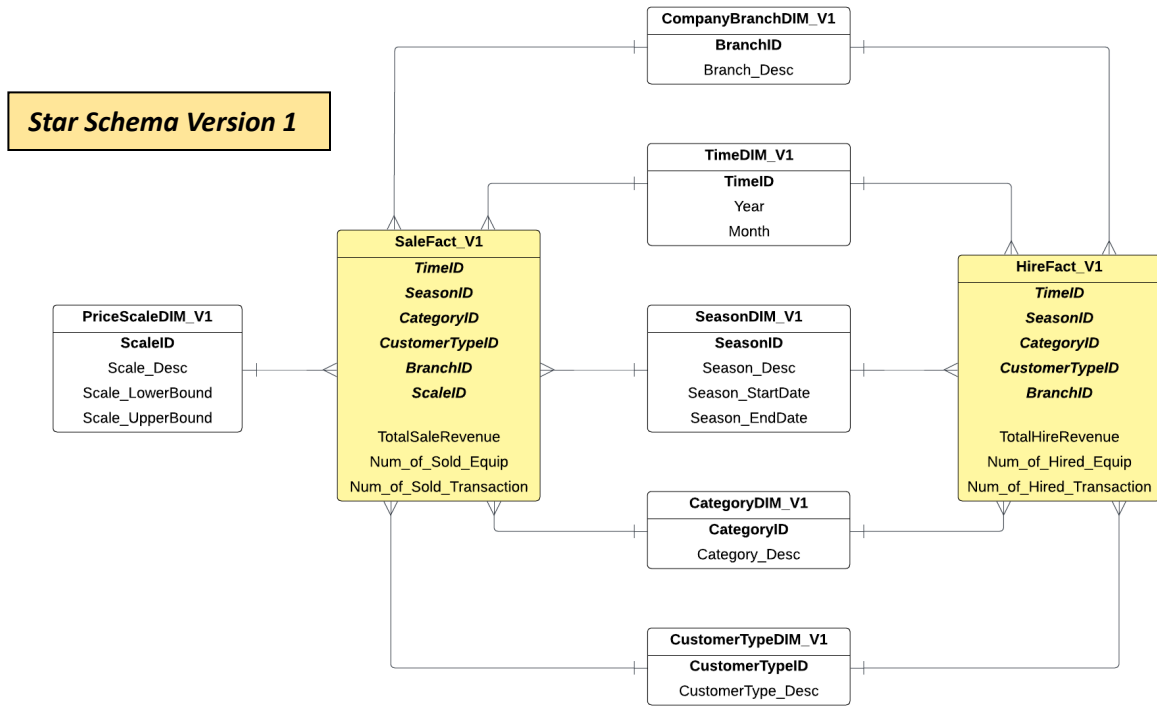
**Mohammad Nadzmi Ag Thomas (32518625)**

# Task C.1

a) E/R diagram of the operational database

b) Star schemas version 1 and 2

**Star Schema Version 1**

**CompanyBranchDIM_V1**
- **BranchID**
- Branch_Desc

**TimeDIM_V1**
- **TimeID**
- Year
- Month

**SaleFact_V1**
- *TimeID*
- *SeasonID*
- *CategoryID*
- *CustomerTypeID*
- *BranchID*
- *ScaleID*

- TotalSaleRevenue
- Num_of_Sold_Equip
- Num_of_Sold_Transaction

**HireFact_V1**
- *TimeID*
- *SeasonID*
- *CategoryID*
- *CustomerTypeID*
- *BranchID*

- TotalHireRevenue
- Num_of_Hired_Equip
- Num_of_Hired_Transaction

**PriceScaleDIM_V1**
- **ScaleID**
- Scale_Desc
- Scale_LowerBound
- Scale_UpperBound

**SeasonDIM_V1**
- **SeasonID**
- Season_Desc
- Season_StartDate
- Season_EndDate

**CategoryDIM_V1**
- **CategoryID**
- Category_Desc

**CustomerTypeDIM_V1**
- **CustomerTypeID**
- CustomerType_Desc

**Star Schema Version 2**

**StaffDIM_V2**
- **Staff_ID**
- First_Name
- Last_Name
- Gender
- Phone
- Email
- Company_Branch

**SalesDIM_V2**
- **Sales_ID**
- Sales_Date
- Quantity
- Unit_Sales_Price
- Total_Sales_Price

**SellingFact_V2**
- *Staff_ID*
- *Equipment_ID*
- *Sales_ID*
- *Customer_ID*

- TotalSaleRevenue

**EquipmentDIM_V2**
- **Equipment_ID**
- Equipment_Name
- Equipment_Price
- Manufacture_Year
- Manufacturer
- CategoryID

**HiringFact_V2**
- *Staff_ID*
- *Equipment_ID*
- *Hire_ID*
- *Customer_ID*

- TotalHireRevenue

**HireDIM_V2**
- **Hire_ID**
- Start_Date
- End_Date
- Quantity
- Unit_Hire_Price
- Total_Hire_Price

**CustomerDIM_V2**
- **Customer_ID**
- Customer_Type_ID
- Name
- Gender
- Address_ID
- Phone
- Email

c)

In the context of sales and hire of equipment, Slowly Changing Dimensions (SCD) play a crucial role in data warehousing to maintain accurate historical records. SCD Type 1, focusing on the latest values, suits scenarios where the sales and hire records don't require historical context, ensuring simplicity and efficiency in storage.

On the other hand, SCD Type 2 captures historical changes, relevant in situations where it's important to differentiate between different versions of equipment over time. This method appends new records to the main dimension, providing a clear timeline of changes without complicating the schema.

SCD Type 3 simplifies this approach by storing only limited historical data, like the current and previous prices. This method streamlines the database, providing a balance between historical context and simplicity.

SCD Type 4 introduces a new dimension to store changes, eliminating the need for unique identifiers for the same sale or hire. This method ensures accuracy by preserving the entire history of attribute value changes, guaranteeing precise reporting.

Lastly, SCD Type 6 combines the advantages of both Type 2 and Type 3. It maintains historical accuracy without the need for separate identifiers, keeping the entire history within the original dimension table. This method is especially useful in scenarios where a detailed history is necessary for both sales and hire records without complicating the database structure.

Based on the major assignment description, MonEquip does not need the history of the price for hire and sales, but MonEquip wants to keep track of its business, such as calculating revenue, number of equipment sold or hired, etc. In brief, SCD dimensions are not needed since there is no requirement from the company itself. Star schema versions 1 and 2 prioritise simplicity and efficiency in querying current data, without the complexity introduced by SCDs for historical tracking.


d)


*Difference between Star Schema Version 1 and 2*


The main difference between Star Schema Version 1 and 2 lies in their level of aggregation, Star Schema Version 1 has the highest level of aggregation, while Star Schema Version 2 has the lowest level of aggregation (Level-0). The level of aggregation is inversely related to the granularity of the Star Schema, where the higher the level of aggregation the lower the granularity of the data provided.

In Star Schema Version 1 (highest level of aggregation), the data model provided is in the lowest form of granularity. In other words, it is the most summarised or aggregated view of the data we can construct using the data available in the database. For example, we are only concerned with crucial information such as Total Revenue, Number of Hired/Sold Equipment, Number of Transaction, Season, Year, Month, Customer Type, CategoryID, and Price Scale which all can be further broken down into more granular levels.

In contrast, in Star Schema Version 2 (lowest level of aggregation), the data model provided has the lowest level of aggregation available in the source system. In other words, it is the most detailed view of the data we can construct using the data available in the database. For example, instead of using Month, Year, and Season, we will use the actual date to store the time (Sales_Date for Sales data, Start_Date, and End_Date for Hire data). The date can't be further broken down as the information regarding Hours, Minutes, etc isn't available in the database. Moreover, we also include three new entities, Equipment which is broken down from Category Dimension, Customer which is broken down from Customer Type DImension, and Staff which is broken down from Branch Dimension.

## Task C.2 (DATA CLEANING STAGE)

a)

*--Problem 1*

*--There are duplicated values in the customer table.*

```
SELECT
    customer_id,
    COUNT(*)
FROM
    customer
GROUP BY
    customer_id
HAVING
    COUNT(*) > 1;
```

*--Solution Problem 1*

```
CREATE TABLE customer_clean
    AS
        SELECT DISTINCT
            *
        FROM
            customer
        ORDER BY
            customer_id;
```

*--Problem 2*

*--There is a relationship problem between HIRE table and EQUIPMENT, STAFF, CUSTOMER tables where there is some equipment_id, staff_id, and customer_id in Hire table which not listed in those tables*

*-- Relationship error between Hire-Equipment*

```sql
SELECT
    *
FROM
    hire
WHERE
    equipment_id NOT IN (
        SELECT
            equipment_id
        FROM
            equipment
    );
```

-- *Relationship error between Hire-Customer*

```sql
SELECT
    *
FROM
    hire
WHERE
    customer_id NOT IN (
        SELECT
            customer_id
        FROM
            customer
    );
```

-- *Relationship error between Hire-Staff*

```sql
SELECT
    *
```

```sql
FROM
    hire
WHERE
    staff_id NOT IN (
        SELECT
            staff_id
        FROM
            staff
    );
```

*--Solution Problem 2*

```sql
DELETE
FROM
    hire
WHERE
    equipment_id NOT IN (
        SELECT
            equipment_id
        FROM
            equipment
    );

DELETE
FROM
    hire
WHERE
    customer_id NOT IN (
        SELECT
```

```
        customer_id
    FROM
        customer
  );


DELETE
FROM
  hire
WHERE
  staff_id NOT IN (
    SELECT
        staff_id
    FROM
        staff
  );
```

*--Problem 3*

*--There are inconsistent values where the end date is not after the start date in HIRE table*

```
SELECT
  *
FROM
  hire
WHERE
  end_date < start_date;
```

*--Solution Problem 3*

```
DELETE
FROM
```

```
   hire
WHERE
   end_date < start_date;
```

*--Problem 4*

*--The end_date for year component is greater than December 2020 in HIRE table*

```
SELECT
   *
FROM
   hire
WHERE
   to_char(end_date, 'YYYY') > 2020;
```

*--Solution Problem 4*

```
DELETE
FROM
   hire
WHERE
   to_char(end_date, 'YYYY') > 2020;
```

*--Problem 5*

*--There is a null value in CATEGORY table*

```
SELECT
   *
FROM
   category
WHERE
   category_description = 'null';
```

*--Solution Problem 5*

```
DELETE
FROM
    category
WHERE
    category_description = 'null';
```

*--Problem 6*

*--There is negative value in quantity attribute in SALES table*

```
SELECT
    *
FROM
    sales
WHERE
    quantity < 0;
```

*--Solution Problem 6*

```
DELETE
FROM
    sales
WHERE
    quantity < 0;
```

*--Problem 7*

*--There is wrong calculation on total_hire_price in HIRE table*

```
SELECT
    *
FROM
```

```
    hire
WHERE
      start_date != end_date
   AND total_hire_price != ( end_date - start_date ) * quantity * unit_hire_price;
```

*--Solution Problem 7*

```
UPDATE hire
SET
   total_hire_price = ( end_date - start_date ) * quantity * unit_hire_price
WHERE
      start_date != end_date
   AND total_hire_price != ( end_date - start_date ) * quantity * unit_hire_price;
```

*--Problem 8*

*--There are negative values in total_hire price in HIRE table*

```
SELECT
   *
FROM
   hire
WHERE
   total_hire_price < 0;
```

*--Solution Problem 8*

```
DELETE
FROM
   hire
WHERE
   total_hire_price < 0;
```

*--Problem 9*

*--Relationship problem between equipment table and category table*

```sql
SELECT
    *
FROM
    equipment
WHERE
    category_id NOT IN (
        SELECT
            category_id
        FROM
            category
    );
```

*--Solution Problem 9*

```sql
DELETE
FROM
    equipment
WHERE
    category_id NOT IN (
        SELECT
            category_id
        FROM
            category
    );
```

d)

**Before Data Cleaning**

- **PROBLEM 1 (Duplicated values in Customer Table)**

| | CUSTOMER_ID | CUSTOMER_TYPE_ID | NAME | GENDER | ADDRESS_ID | PHONE | EMAIL |
|---|---|---|---|---|---|---|---|
| 1 | 52 | 2 | Abbie Maddie | Male | 52 | 904 627 9038 | amaddielf@columbia.edu |
| 2 | 52 | 2 | Abbie Maddie | Male | 52 | 904 627 9038 | amaddielf@columbia.edu |
| 3 | 52 | 2 | Abbie Maddie | Male | 52 | 904 627 9038 | amaddielf@columbia.edu |
| 4 | 52 | 2 | Abbie Maddie | Male | 52 | 904 627 9038 | amaddielf@columbia.edu |

- **PROBLEM 2 (relationship problem between HIRE table and EQUIPMENT, STAFF, CUSTOMER tables where there are some equipment_id, staff_id, and customer_id in Hire table)**

| | HIRE_ID | START_DATE | END_DATE | EQUIPMENT_ID | QUANTITY | UNIT_HIRE_PRICE | TOTAL_HIRE_PRICE | CUSTOMER_ID | STAFF_ID |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 301 | 08-DEC-20 | 08-DEC-20 | 190 | 1 | 300 | 300 | 181 | 174 |
| 2 | 303 | 25-JAN-90 | 27-DEC-99 | 43 | 3 | 50 | -150 | 53 | 223 |
| 3 | 302 | 05-DEC-20 | 17-OCT-20 | 21 | 2 | 100 | 200 | 111 | 123 |
| 4 | 304 | 08-DEC-20 | 08-DEC-20 | 114 | 1 | 350 | -1 | 34 | 85 |

- **PROBLEM 3 (inconsistent values where the end date is not after the start date in HIRE table)**

| | HIRE_ID | START_DATE | END_DATE | EQUIPMENT_ID | QUANTITY | UNIT_HIRE_PRICE | TOTAL_HIRE_PRICE | CUSTOMER_ID | STAFF_ID |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 302 | 05-DEC-20 | 17-OCT-20 | 21 | 2 | 100 | 200 | 111 | 123 |

- **PROBLEM 4 (The end_date for year component is greater than December 2020 in HIRE table)**

| | HIRE_ID | START_DATE | END_DATE | EQUIPMENT_ID | QUANTITY | UNIT_HIRE_PRICE | TOTAL_HIRE_PRICE | CUSTOMER_ID | STAFF_ID |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 303 | 25-JAN-90 | 27-DEC-99 | 43 | 3 | 50 | -150 | 53 | 223 |

- **PROBLEM 5 (null value in CATEGORY table)**

| | CATEGORY_ID | CATEGORY_DESCRIPTION |
|---|---|---|
| 1 | 15 | null |

- **PROBLEM 6 (negative value in quantity attribute in SALES table)**

| | SALES_ID | SALES_DATE | EQUIPMENT_ID | QUANTITY | UNIT_SALES_PRICE | TOTAL_SALES_PRICE | CUSTOMER_ID | STAFF_ID |
|---|---|---|---|---|---|---|---|---|
| 1 | 151 | 15-DEC-20 | 20 | -3 | 45500 | 182000 | 2 | 37 |

- **PROBLEM 7 (wrong calculation on total_hire_price in HIRE table)**

| | HIRE_ID | START_DATE | END_DATE | EQUIPMENT_ID | QUANTITY | UNIT_HIRE_PRICE | TOTAL_HIRE_PRICE | CUSTOMER_ID | STAFF_ID |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 11-MAY-18 | 14-MAY-18 | 135 | 3 | 80 | 240 | 77 | 2 |
| 2 | 2 | 17-MAY-18 | 20-MAY-18 | 49 | 2 | 660 | 1320 | 70 | 38 |
| 3 | 4 | 21-MAY-18 | 25-MAY-18 | 36 | 1 | 540 | 540 | 124 | 41 |
| 4 | 5 | 21-MAY-18 | 23-MAY-18 | 37 | 2 | 600 | 1200 | 87 | 35 |
| 5 | 6 | 22-MAY-18 | 26-MAY-18 | 53 | 2 | 500 | 1000 | 15 | 31 |
| 6 | 7 | 24-MAY-18 | 28-MAY-18 | 73 | 3 | 140 | 420 | 77 | 10 |
| 7 | 8 | 25-MAY-18 | 28-MAY-18 | 135 | 3 | 80 | 240 | 140 | 40 |
| 8 | 11 | 12-JUN-18 | 14-JUN-18 | 71 | 2 | 450 | 900 | 145 | 21 |
| 9 | 18 | 12-JUL-18 | 14-JUL-18 | 25 | 3 | 600 | 1800 | 114 | 3 |
| 10 | 24 | 27-JUL-18 | 29-JUL-18 | 99 | 2 | 20 | 40 | 63 | 5 |
| 11 | 25 | 27-JUL-18 | 29-JUL-18 | 147 | 1 | 220 | 220 | 19 | 2 |
| 12 | 26 | 30-JUL-18 | 03-AUG-18 | 22 | 3 | 450 | 1350 | 113 | 27 |
| 13 | 27 | 01-AUG-18 | 03-AUG-18 | 10 | 2 | 360 | 720 | 99 | 47 |

- **PROBLEM 8 (negative values in total_hire price in HIRE table)**

| | HIRE_ID | START_DATE | END_DATE | EQUIPMENT_ID | QUANTITY | UNIT_HIRE_PRICE | TOTAL_HIRE_PRICE | CUSTOMER_ID | STAFF_ID |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 303 | 25-JAN-90 | 27-DEC-99 | 43 | 3 | 50 | -150 | 53 | 223 |
| 2 | 304 | 08-DEC-20 | 08-DEC-20 | 114 | 1 | 350 | -1 | 34 | 85 |

- **PROBLEM 9 (Relationship problem between equipment table and category table)**

| | EQUIPMENT_ID | EQUIPMENT_NAME | EQUIPMENT_PRICE | MANUFACTURE_YEAR | MANUFACTURER | CATEGORY_ID |
|---|---|---|---|---|---|---|
| 1 | 158 | EXCAVATOR - POST HOLE ATTACHMENT SUIT 3.5T | 12200 | 2017 | HITACHI | 15 |

**After Data Cleaning**

**-- Category Table**

| | CATEGORY_ID | CATEGORY_DESCRIPTION |
|---|---|---|
| 1 | 1 | Access |
| 2 | 2 | Air Compressor |
| 3 | 3 | Compaction |
| 4 | 4 | Concrete |
| 5 | 5 | Earthmoving |
| 6 | 6 | Generators |
| 7 | 7 | Landscaping |
| 8 | 8 | Lighting |
| 9 | 9 | Plumbing |
| 10 | 10 | Rail |
| 11 | 11 | Safety |
| 12 | 12 | Site Equipment |
| 13 | 13 | Trailers |
| 14 | 14 | Vehicles |

## -- Customer Table

| | CUSTOMER_ID | CUSTOMER_TYPE_ID | NAME | GENDER | ADDRESS_ID | PHONE | EMAIL |
|---|---|---|---|---|---|---|---|
| 36 | 36 | 2 | Edward Nesterov | Male | 36 | 294 947 1931 | enesterovz@usatoday.com |
| 37 | 37 | 1 | Brucie Ducarne | Male | 37 | 795 851 6198 | bducarne10@cdc.gov |
| 38 | 38 | 2 | Augustin Lofting | Male | 38 | 310 903 3754 | alofting11@shinystat.com |
| 39 | 39 | 1 | Sloane Tofpik | Male | 39 | 391 519 8536 | stofpik12@ebay.co.uk |
| 40 | 40 | 1 | Iggy Olorenshaw | Male | 40 | 398 697 7185 | iolorenshaw13@behance.net |
| 41 | 41 | 1 | Clareta Tibbotts | Female | 41 | 297 212 4911 | ctibbotts14@phoca.cz |
| 42 | 42 | 1 | Audy Dabes | Female | 42 | 144 953 2638 | adabes15@blinklist.com |
| 43 | 43 | 1 | Blakeley De Gregorio | Female | 43 | 581 203 0392 | bde16@github.com |
| 44 | 44 | 1 | Lynn Mandal | Female | 44 | 159 685 4255 | lmandal17@prweb.com |
| 45 | 45 | 1 | Shae Bowbrick | Female | 45 | 713 248 0235 | sbowbrick18@fema.gov |
| 46 | 46 | 2 | Koressa Avery | Female | 46 | 302 523 4116 | kavery19@sbwire.com |
| 47 | 47 | 2 | Selle Berriman | Female | 47 | 796 382 3259 | sberriman1a@google.nl |
| 48 | 48 | 2 | Marmaduke Ganter | Male | 48 | 381 255 1620 | mganter1b@about.com |
| 49 | 49 | 1 | Claudie Gleasane | Female | 49 | 962 239 6598 | cgleasane1c@cdc.gov |
| 50 | 50 | 2 | Allys Portal | Female | 50 | 426 559 2409 | aportal1d@shareasale.com |
| 51 | 51 | 1 | Maye Cathenod | Female | 51 | 326 485 2175 | mcathenod1e@istockphoto.com |
| 52 | 52 | 2 | Abbie Maddie | Male | 52 | 904 627 9038 | amaddie1f@columbia.edu |
| 53 | 53 | 2 | Jenny Joincey | Female | 53 | 546 907 3535 | jjoincey1g@people.com.cn |
| 54 | 54 | 1 | Nichols Norvell | Male | 54 | 890 907 0718 | nnorvell1h@cafepress.com |
| 55 | 55 | 1 | Brook Wrixon | Female | 55 | 625 901 9661 | bwrixon1i@hhs.gov |
| 56 | 56 | 2 | Tome Sweeny | Male | 56 | 359 981 0425 | tsweeny1j@1688.com |
| 57 | 57 | 2 | Ailina Giddings | Female | 57 | 119 681 8901 | agiddings1k@arstechnica.com |
| 58 | 58 | 2 | Ethelda Stook | Female | 58 | 135 884 9896 | estook1l@amazon.co.uk |
| 59 | 59 | 2 | Deni Rraundl | Female | 59 | 135 394 0610 | drraundl1m@amazonaws.com |
| 60 | 60 | 1 | Wallie Schleswig-H... | Female | 60 | 814 839 0927 | wschleswigholstein1n@newsvine... |
| 61 | 61 | 2 | Ilise Northover | Female | 61 | 288 559 8632 | inorthover1o@pbs.org |
| 62 | 62 | 1 | Yorgos Bagehot | Male | 62 | 306 340 5856 | ybagehot1p@wsj.com |
| 63 | 63 | 1 | Sammy Tilberry | Male | 63 | 901 564 6081 | stilberry1q@chron.com |
| 64 | 64 | 2 | Lorrin Proffitt | Female | 64 | 612 139 1280 | lproffitt1r@t.co |
| 65 | 65 | 2 | Wendie Taggert | Female | 65 | 759 671 7010 | wtaggert1s@springer.com |

## -- Equipment Table

| | | | | | |
|---|---|---|---|---|---|
| 128 | 128 | FALL ARRESTOR  6M HORIZONTAL | 4500 | 2000 JCB | 11 |
| 129 | 129 | ROOFERS KIT | 5400 | 2009 Kobelco | 11 |
| 130 | 130 | SAFETY HARNESS | 2520 | 2004 Bobcat | 11 |
| 131 | 131 | ROOFER LIFELINE HORIZONTAL SYSTEM 18M | 6500 | 2004 Kobelco | 11 |
| 132 | 132 | TOILET (X2) FRESHWATER WITH TRAILER | 25200 | 2016 Volvo | 12 |
| 133 | 133 | TOILET (X3) FRESHWATER WITH TRAILER | 33600 | 2001 Kobelco | 12 |
| 134 | 134 | TOILET ACCESSIBLE | 8640 | 2015 Yanmar | 12 |
| 135 | 135 | SHOWER SINGLE PORTABLE | 6240 | 2015 Komatsu | 12 |
| 136 | 136 | WASH STATION PORTABLE | 3000 | 2017 Kenworth | 12 |
| 137 | 137 | PROP HIGH LOAD 4.30M - 6.25M | 1040 | 2010 Yanmar | 12 |
| 138 | 138 | TIPPING SKIPS | 4320 | 2001 Kobelco | 12 |
| 139 | 139 | BIN - 240L | 1200 | 2010 Komatsu | 12 |
| 140 | 140 | WASTE BIN 0.7 CUB.M | 3840 | 2002 Yanmar | 12 |
| 141 | 141 | TRAILER - BOX 1.8M X 1.2M (6FT X 4FT) | 5200 | 2001 Bobcat | 13 |
| 142 | 142 | TRAILER - ENCLOSED LARGE | 18000 | 2007 Volvo | 13 |
| 143 | 143 | TRAILER - ENCLOSED MEDIUM | 7200 | 2002 Case | 13 |
| 144 | 144 | TRAILER - FURNITURE | 4800 | 2014 Kenworth | 13 |
| 145 | 145 | TRAILER - CAGE MEDIUM | 8400 | 2004 Volvo | 13 |
| 146 | 146 | TRAILER - CAGE LARGE TANDEM | 10560 | 2017 Hitachi | 13 |
| 147 | 147 | TRAILER - FLAT TOP | 14520 | 2004 Kenworth | 13 |
| 148 | 148 | TRAILER - PLANT/DROP DECK | 6720 | 2015 Volvo | 13 |
| 149 | 149 | TRAILER - PLANT/MACHINERY SMALL | 7200 | 2002 Komatsu | 13 |
| 150 | 150 | TRAILER - EXCAVATOR | 6480 | 2017 Caterpillar | 13 |
| 151 | 151 | TRAILER - BIKE | 3600 | 2012 Kobelco | 13 |
| 152 | 152 | TABLETOP 1T AUTO | 10800 | 2000 Kobelco | 14 |
| 153 | 153 | VAN - 1T | 16800 | 2005 JCB | 14 |
| 154 | 154 | TIPPER 2T | 23400 | 2006 Hitachi | 14 |
| 155 | 155 | TIPPER CREW CAB | 16000 | 2008 Caterpillar | 14 |
| 156 | 156 | TIPPER 5T | 31200 | 2013 JCB | 14 |
| 157 | 157 | TRAILER - LIVESTOCK | 14400 | 2010 Volvo | 14 |

## -- Hire Table

| | HIRE_ID | START_DATE | END_DATE | EQUIPMENT_ID | QUANTITY | UNIT_HIRE_PRICE | TOTAL_HIRE_PRICE | CUSTOMER_ID | STAFF_ID |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 11-MAY-18 | 14-MAY-18 | 135 | 3 | 80 | 720 | 77 | 2 |
| 2 | 2 | 17-MAY-18 | 20-MAY-18 | 49 | 2 | 660 | 3960 | 70 | 38 |
| 3 | 3 | 18-MAY-18 | 19-MAY-18 | 117 | 1 | 150 | 150 | 58 | 17 |
| 4 | 4 | 21-MAY-18 | 25-MAY-18 | 36 | 1 | 540 | 2160 | 124 | 41 |
| 5 | 5 | 21-MAY-18 | 23-MAY-18 | 37 | 2 | 600 | 2400 | 87 | 35 |
| 6 | 6 | 22-MAY-18 | 26-MAY-18 | 53 | 2 | 500 | 4000 | 15 | 31 |
| 7 | 7 | 24-MAY-18 | 28-MAY-18 | 73 | 3 | 140 | 1680 | 77 | 10 |
| 8 | 8 | 25-MAY-18 | 28-MAY-18 | 135 | 3 | 80 | 720 | 140 | 40 |
| 9 | 9 | 28-MAY-18 | 28-MAY-18 | 127 | 2 | 170 | 170 | 8 | 46 |
| 10 | 10 | 29-MAY-18 | 29-MAY-18 | 86 | 2 | 200 | 200 | 5 | 28 |
| 11 | 11 | 12-JUN-18 | 14-JUN-18 | 71 | 2 | 450 | 1800 | 145 | 21 |
| 12 | 12 | 15-JUN-18 | 15-JUN-18 | 23 | 2 | 360 | 360 | 74 | 43 |
| 13 | 13 | 24-JUN-18 | 25-JUN-18 | 61 | 3 | 150 | 450 | 114 | 10 |
| 14 | 14 | 25-JUN-18 | 25-JUN-18 | 85 | 3 | 210 | 315 | 110 | 44 |
| 15 | 15 | 30-JUN-18 | 01-JUL-18 | 9 | 1 | 360 | 360 | 47 | 8 |
| 16 | 16 | 05-JUL-18 | 05-JUL-18 | 74 | 1 | 280 | 140 | 129 | 7 |
| 17 | 17 | 07-JUL-18 | 08-JUL-18 | 85 | 2 | 250 | 500 | 134 | 44 |
| 18 | 18 | 12-JUL-18 | 14-JUL-18 | 25 | 3 | 600 | 3600 | 114 | 3 |
| 19 | 19 | 13-JUL-18 | 14-JUL-18 | 112 | 1 | 300 | 300 | 135 | 47 |
| 20 | 20 | 13-JUL-18 | 14-JUL-18 | 141 | 3 | 80 | 240 | 71 | 28 |
| 21 | 21 | 14-JUL-18 | 15-JUL-18 | 145 | 2 | 100 | 200 | 7 | 33 |
| 22 | 22 | 23-JUL-18 | 24-JUL-18 | 4 | 1 | 395 | 395 | 110 | 15 |
| 23 | 23 | 26-JUL-18 | 27-JUL-18 | 125 | 3 | 140 | 420 | 19 | 44 |
| 24 | 24 | 27-JUL-18 | 29-JUL-18 | 99 | 2 | 20 | 80 | 63 | 5 |
| 25 | 25 | 27-JUL-18 | 29-JUL-18 | 147 | 1 | 220 | 440 | 19 | 2 |
| 26 | 26 | 30-JUL-18 | 03-AUG-18 | 22 | 3 | 450 | 5400 | 113 | 27 |
| 27 | 27 | 01-AUG-18 | 03-AUG-18 | 10 | 2 | 360 | 1440 | 99 | 47 |
| 28 | 29 | 01-AUG-18 | 02-AUG-18 | 31 | 3 | 120 | 360 | 3 | 33 |
| 29 | 28 | 01-AUG-18 | 05-AUG-18 | 133 | 2 | 600 | 4800 | 126 | 28 |
| 30 | 30 | 04-AUG-18 | 04-AUG-18 | 64 | 1 | 220 | 110 | 79 | 34 |

## -- Sales Table

| | SALES_ID | SALES_DATE | EQUIPMENT_ID | QUANTITY | UNIT_SALES_PRICE | TOTAL_SALES_P... | CUSTOMER_ID | STAFF_ID |
|---|---|---|---|---|---|---|---|---|
| 1 | 55 | 18-MAR-19 | 136 | 1 | 5000 | 5000 | 87 | 47 |
| 2 | 16 | 07-AUG-18 | 99 | 2 | 2800 | 5600 | 69 | 10 |
| 3 | 109 | 09-MAY-20 | 103 | 1 | 6400 | 6400 | 134 | 27 |
| 4 | 80 | 12-OCT-19 | 126 | 1 | 9600 | 9600 | 90 | 50 |
| 5 | 58 | 30-APR-19 | 41 | 1 | 10000 | 10000 | 119 | 19 |
| 6 | 15 | 31-JUL-18 | 123 | 2 | 5600 | 11200 | 1 | 26 |
| 7 | 95 | 08-JAN-20 | 82 | 1 | 11200 | 11200 | 122 | 6 |
| 8 | 98 | 11-FEB-20 | 104 | 2 | 5600 | 11200 | 67 | 28 |
| 9 | 28 | 20-SEP-18 | 104 | 2 | 5600 | 11200 | 58 | 40 |
| 10 | 146 | 20-NOV-20 | 130 | 3 | 4200 | 12600 | 51 | 35 |
| 11 | 35 | 27-OCT-18 | 145 | 1 | 14000 | 14000 | 72 | 32 |
| 12 | 20 | 18-AUG-18 | 145 | 1 | 14000 | 14000 | 66 | 36 |
| 13 | 137 | 14-OCT-20 | 143 | 1 | 14400 | 14400 | 34 | 17 |
| 14 | 18 | 08-AUG-18 | 107 | 3 | 4800 | 14400 | 59 | 21 |
| 15 | 106 | 22-APR-20 | 118 | 1 | 15600 | 15600 | 61 | 33 |
| 16 | 145 | 14-NOV-20 | 75 | 1 | 16000 | 16000 | 100 | 36 |
| 17 | 82 | 26-OCT-19 | 104 | 3 | 5600 | 16800 | 134 | 7 |
| 18 | 49 | 10-FEB-19 | 123 | 3 | 5600 | 16800 | 55 | 21 |
| 19 | 81 | 20-OCT-19 | 146 | 1 | 17600 | 17600 | 40 | 21 |
| 20 | 75 | 04-SEP-19 | 34 | 1 | 18000 | 18000 | 50 | 1 |
| 21 | 73 | 05-AUG-19 | 34 | 1 | 18000 | 18000 | 19 | 17 |
| 22 | 67 | 01-JUL-19 | 120 | 2 | 9000 | 18000 | 74 | 1 |
| 23 | 63 | 22-MAY-19 | 152 | 1 | 18000 | 18000 | 70 | 14 |
| 24 | 17 | 08-AUG-18 | 27 | 1 | 18000 | 18000 | 72 | 21 |
| 25 | 4 | 05-JUN-18 | 151 | 2 | 9000 | 18000 | 150 | 16 |
| 26 | 2 | 17-APR-18 | 128 | 2 | 9000 | 18000 | 72 | 29 |
| 27 | 144 | 10-NOV-20 | 151 | 2 | 9000 | 18000 | 25 | 46 |
| 28 | 26 | 15-SEP-18 | 72 | 2 | 9600 | 19200 | 81 | 43 |
| 29 | 7 | 09-JUL-18 | 95 | 1 | 19200 | 19200 | 106 | 3 |
| 30 | 56 | 31-MAR-19 | 107 | 4 | 4800 | 19200 | 120 | 16 |

## Task C.3

a)

*SQL Statements Star Schema Version 1*

<div style="background-color: #FCD77D;">

**Star Schema Version 1**

</div>

*----------------------------------------------*

*-- Create Dimension Tables*

*----------------------------------------------*

*-- CompanyBranchDIM_V1*

```sql
CREATE SEQUENCE branch_id_seq START WITH 1 INCREMENT BY 1 MAXVALUE 15 NOCYCLE;


CREATE TABLE companybranchdim_v1
  AS
    SELECT
      branch_id_seq.NEXTVAL AS branchid,
      branch_desc
    FROM
      (
        SELECT DISTINCT
          company_branch AS branch_desc
        FROM
          staff
        ORDER BY
          company_branch
      ) ordered_branches;
```

*-- TimeDIM_V1*

```sql
CREATE TABLE timedim_v1
```

```
AS

    SELECT DISTINCT

        to_char(d, 'yyyymm') AS timeid,

        to_char(d, 'yyyy')   AS year,

        to_char(d, 'MONTH')  AS month

    FROM

    (

        SELECT

            start_date AS d

        FROM

            hire

        UNION

        SELECT

            sales_date AS d

        FROM

            sales

    )

    ORDER BY

        year,

        to_char(TO_DATE(month, 'MONTH'),

            'MM');
```

*-- SeasonDIM_V1*

```
CREATE TABLE seasondim_v1 (

    seasonid       CHAR(1),

    season_desc    VARCHAR2(20),

    season_startdate VARCHAR2(10),

    season_enddate   VARCHAR2(10)
```

```
);
```

-- **Summer Dec-Feb**
```
INSERT INTO seasondim_v1 VALUES (
    1,
    'Summer',
    '01-DEC',
    '29-FEB'
);
```

-- **Autumn Feb-May**
```
INSERT INTO seasondim_v1 VALUES (
    2,
    'Autumn',
    '01-MAR',
    '31-MAY'
);
```

-- **Winter Jun-Aug**
```
INSERT INTO seasondim_v1 VALUES (
    3,
    'Winter',
    '01-JUN',
    '31-AUG'
);
```

-- **Spring Sep-Nov**
```
INSERT INTO seasondim_v1 VALUES (
```

```
    4,
    'Spring',
    '01-SEP',
    '30-NOV'
);
```

-- *CategoryDIM_V1*

```
CREATE TABLE categorydim_v1
   AS
      SELECT
          category_id        AS categoryid,
          category_description AS category_desc
      FROM
          category;
```

-- *CustomerTypeDIM_V1*

```
CREATE TABLE customertypedim_v1
   AS
      SELECT
          customer_type_id AS customertypeid,
          description      AS customertype_desc
      FROM
          customer_type;
```

-- *PriceScaleDIM_V1*

```
CREATE TABLE pricescaledim_v1 (
   scaleid        VARCHAR2(10),
   scale_desc     VARCHAR2(50),
```

```sql
    scale_lowerbound NUMBER(10),

    scale_upperbound NUMBER(10)

);


INSERT INTO pricescaledim_v1 VALUES (

    1,

    'LOW',

    0,

    4999

);


INSERT INTO pricescaledim_v1 VALUES (

    2,

    'MEDIUM',

    5000,

    10000

);


INSERT INTO pricescaledim_v1 VALUES (

    3,

    'HIGH',

    10001,

    power(10, 10) - 1

);
```

----------------------------------------------

*-- Create Fact Tables*

----------------------------------------------


*-- HireFact_V1*

```sql
CREATE TABLE hirefact_v1
   AS
      SELECT
         to_char(hi.start_date, 'YYYYMM') AS timeid,
         CASE
            WHEN to_char(hi.start_date, 'MM') IN ( '12', '01', '02' ) THEN
               1
            WHEN to_char(hi.start_date, 'MM') BETWEEN '03' AND '05' THEN
               2
            WHEN to_char(hi.start_date, 'MM') BETWEEN '06' AND '08' THEN
               3
            WHEN to_char(hi.start_date, 'MM') BETWEEN '09' AND '11' THEN
               4
         END                  AS seasonid,
         eq.category_id            AS categoryid,
         ct.customer_type_id         AS customertypeid,
         cb.branchid,
         SUM(hi.total_hire_price)     AS totalhirerevenue,
         COUNT(*)              AS num_of_hired_transaction,
         SUM(hi.quantity)          AS num_of_hired_equip
      FROM
            hire hi
         JOIN equipment       eq ON eq.equipment_id = hi.equipment_id
```

```sql
      JOIN customer_clean      ct ON ct.customer_id = hi.customer_id
      JOIN staff            st ON st.staff_id = hi.staff_id
      JOIN companybranchdim_v1 cb ON cb.branch_desc = st.company_branch
   GROUP BY
     to_char(hi.start_date, 'YYYYMM'),
     CASE
         WHEN to_char(hi.start_date, 'MM') IN ( '12', '01', '02' ) THEN
           1
         WHEN to_char(hi.start_date, 'MM') BETWEEN '03' AND '05' THEN
           2
         WHEN to_char(hi.start_date, 'MM') BETWEEN '06' AND '08' THEN
           3
         WHEN to_char(hi.start_date, 'MM') BETWEEN '09' AND '11' THEN
           4
     END,
     eq.category_id,
     ct.customer_type_id,
     cb.branchid;


-- SalesFact_V1
CREATE TABLE salesfact_v1
   AS
     SELECT
       to_char(sl.sales_date, 'yyyymm') AS timeid,
       CASE
         WHEN to_char(sl.sales_date, 'mm') IN ( 12, 01, 02 ) THEN
           1
         WHEN to_char(sl.sales_date, 'mm') BETWEEN 03 AND 05 THEN
```

```
            2
        WHEN to_char(sl.sales_date, 'mm') BETWEEN 06 AND 08 THEN
            3
        WHEN to_char(sl.sales_date, 'mm') BETWEEN 09 AND 11 THEN
            4
    END                     AS seasonid,
    eq.category_id          AS categoryid,
    ct.customer_type_id     AS customertypeid,
    cb.branchid,
    CASE
        WHEN sl.total_sales_price < 5000  THEN
            1
        WHEN sl.total_sales_price > 10000 THEN
            3
        ELSE
            2
    END                     AS scaleid,
    SUM(sl.total_sales_price)     AS totalsalesrevenue,
    COUNT(*)                AS num_of_sold_transaction,
    SUM(sl.quantity)        AS num_of_sold_equip
FROM
    sales sl
    JOIN equipment        eq ON eq.equipment_id = sl.equipment_id
    JOIN customer_clean   ct ON ct.customer_id = sl.customer_id
    JOIN staff            st ON st.staff_id = sl.staff_id
    JOIN companybranchdim_v1 cb ON cb.branch_desc = st.company_branch
GROUP BY
    CASE
```

```
      WHEN sl.total_sales_price < 5000  THEN

        1

      WHEN sl.total_sales_price > 10000 THEN

        3

      ELSE

        2

END,

to_char(sl.sales_date, 'yyyymm'),

CASE

    WHEN to_char(sl.sales_date, 'mm') IN ( 12, 01, 02 ) THEN

        1

    WHEN to_char(sl.sales_date, 'mm') BETWEEN 03 AND 05 THEN

        2

    WHEN to_char(sl.sales_date, 'mm') BETWEEN 06 AND 08 THEN

        3

    WHEN to_char(sl.sales_date, 'mm') BETWEEN 09 AND 11 THEN

        4

END,

eq.category_id,

ct.customer_type_id,

cb.branchid;
```

b)

*SQL Statements Star Schema Version 2*

*Star Schema Version 2*

*-----------------------------------------------*

*-- Create Dimension Tables*

*-----------------------------------------------*

*-- StaffDIM_V2*

CREATE TABLE staffdim_v2

   AS

     SELECT

      *

     FROM

      staff;

*--EquipmentDIM_V2*

CREATE TABLE equipmentdim_v2

   AS

     SELECT

      *

     FROM

      equipment;

*--CustomerDIM_V2*

CREATE TABLE customerdim_v2

   AS

     SELECT

      *

```sql
    FROM
        customer_clean;
```

--*HireDIM_V2*

```sql
CREATE TABLE hiredim_v2
  AS
    SELECT
        hire_id AS hireid,
        start_date,
        end_date,
        quantity,
        unit_hire_price,
        total_hire_price
    FROM
        hire;
```

--*SalesDIM_V2*

```sql
CREATE TABLE salesdim_v2
  AS
    SELECT
        sales_id AS salesid,
        sales_date,
        quantity,
        unit_sales_price,
        total_sales_price
    FROM
        sales;
```

---------------------------------------------
*-- Create Fact Tables*

---------------------------------------------

*-- HiringFact_V2*

```sql
CREATE TABLE hiringfact_v2
  AS
    SELECT
      st.staff_id,
      eq.equipment_id,
      hi.hire_id,
      cc.customer_id,
      SUM(hi.total_hire_price) AS totalhirerevenue
    FROM
        hire hi
      JOIN staff        st ON st.staff_id = hi.staff_id
      JOIN equipment     eq ON eq.equipment_id = hi.equipment_id
      JOIN customer_clean cc ON cc.customer_id = hi.customer_id
    GROUP BY
      st.staff_id,
      eq.equipment_id,
      hi.hire_id,
      cc.customer_id;
```

*--SellingFact_V2*

```sql
CREATE TABLE sellingfact_v2
  AS
    SELECT
      st.staff_id,
```

```
        eq.equipment_id,

        sl.sales_id,

        cc.customer_id,

        SUM(sl.total_sales_price) AS totalsalesrevenue

    FROM

        sales sl

        JOIN staff        st ON st.staff_id = sl.staff_id

        JOIN equipment    eq ON eq.equipment_id = sl.equipment_id

        JOIN customer_clean cc ON cc.customer_id = sl.customer_id

    GROUP BY

        st.staff_id,

        eq.equipment_id,

        sl.sales_id,

        cc.customer_id;
```

c)
### Screenshots of the implementation and the tables

■ *CompanyBranchDIM_V1*

```
-- CompanyBranchDIM_V1
CREATE SEQUENCE branch_id_seq START WITH 1 INCREMENT BY 1 MAXVALUE 15 NOCYCLE;

CREATE TABLE companybranchdim_v1
    AS
        SELECT
            branch_id_seq.NEXTVAL AS branchid,
            branch_desc
        FROM
            (
                SELECT DISTINCT
                    company_branch AS branch_desc
                FROM
                    staff
                ORDER BY
                    company_branch
            ) ordered_branches;
```

| | BRANCHID | BRANCH_DESC |
|---|---|---|
| 1 | 1 | Caulfield |
| 2 | 2 | Chadstone |
| 3 | 3 | Cheltenham |
| 4 | 4 | Clayton |
| 5 | 5 | Dandenong |
| 6 | 6 | Docklands |
| 7 | 7 | Eltham |
| 8 | 8 | Fitzroy |
| 9 | 9 | Geelong |
| 10 | 10 | Hughesdale |
| 11 | 11 | Pakenham |
| 12 | 12 | Parkville |
| 13 | 13 | Prahran |
| 14 | 14 | Richmond |
| 15 | 15 | Toorak |

■ *TimeDIM_V1*

```sql
-- TimeDIM_V1
CREATE TABLE timedim_v1
    AS
        SELECT DISTINCT
            to_char(d, 'yyyymm') AS timeid,
            to_char(d, 'yyyy')   AS year,
            to_char(d, 'MONTH')  AS month
        FROM
            (
                SELECT
                    start_date AS d
                FROM
                    hire
                UNION
                SELECT
                    sales_date AS d
                FROM
                    sales
            )
        ORDER BY
            year,
            to_char(TO_DATE(month, 'MONTH'),
                    'MM');
```

| | TIMEID | YEAR | MONTH |
|---|---|---|---|
| 1 | 201804 | 2018 | APRIL |
| 2 | 201805 | 2018 | MAY |
| 3 | 201806 | 2018 | JUNE |
| 4 | 201807 | 2018 | JULY |
| 5 | 201808 | 2018 | AUGUST |
| 6 | 201809 | 2018 | SEPTEMBER |
| 7 | 201810 | 2018 | OCTOBER |
| 8 | 201811 | 2018 | NOVEMBER |
| 9 | 201812 | 2018 | DECEMBER |
| 10 | 201901 | 2019 | JANUARY |
| 11 | 201902 | 2019 | FEBRUARY |
| 12 | 201903 | 2019 | MARCH |
| 13 | 201904 | 2019 | APRIL |
| 14 | 201905 | 2019 | MAY |
| 15 | 201906 | 2019 | JUNE |
| 16 | 201907 | 2019 | JULY |
| 17 | 201908 | 2019 | AUGUST |
| 18 | 201909 | 2019 | SEPTEMBER |
| 19 | 201910 | 2019 | OCTOBER |
| 20 | 201911 | 2019 | NOVEMBER |
| 21 | 201912 | 2019 | DECEMBER |
| 22 | 202001 | 2020 | JANUARY |
| 23 | 202002 | 2020 | FEBRUARY |
| 24 | 202003 | 2020 | MARCH |
| 25 | 202004 | 2020 | APRIL |
| 26 | 202005 | 2020 | MAY |
| 27 | 202006 | 2020 | JUNE |
| 28 | 202007 | 2020 | JULY |
| 29 | 202008 | 2020 | AUGUST |
| 30 | 202009 | 2020 | SEPTEMBER |

■ *SeasonDIM_V1*

```sql
-- SeasonDIM_V1
CREATE TABLE seasondim_v1 (
    seasonid        CHAR(1),
    season_desc     VARCHAR2(20),
    season_startdate VARCHAR2(10),
    season_enddate   VARCHAR2(10)
);

-- Summer Dec-Feb
INSERT INTO seasondim_v1 VALUES (
    1,
    'Summer',
    '01-DEC',
    '29-FEB'
);

-- Autumn Feb-May
INSERT INTO seasondim_v1 VALUES (
    2,
    'Autumn',
    '01-MAR',
    '31-MAY'
);

-- Winter Jun-Aug
INSERT INTO seasondim_v1 VALUES (
    3,
    'Winter',
    '01-JUN',
    '31-AUG'
);

-- Spring Sep-Nov
INSERT INTO seasondim_v1 VALUES (
    4,
    'Spring'
```

| | SEASONID | SEASON_DESC | SEASON_STARTDATE | SEASON_ENDDATE |
|---|---|---|---|---|
| 1 | 1 | Summer | 01-DEC | 29-FEB |
| 2 | 2 | Autumn | 01-MAR | 31-MAY |
| 3 | 3 | Winter | 01-JUN | 31-AUG |
| 4 | 4 | Spring | 01-SEP | 30-NOV |

■ *CategoryDIM_V1*

```sql
-- CategoryDIM_V1
CREATE TABLE categorydim_v1
    AS
        SELECT
            category_id          AS categoryid,
            category_description AS category_desc
        FROM
            category;
```

| | CATEGORYID | CATEGORY_DESC |
|---|---|---|
| 1 | 1 | Access |
| 2 | 2 | Air Compressor |
| 3 | 3 | Compaction |
| 4 | 4 | Concrete |
| 5 | 5 | Earthmoving |
| 6 | 6 | Generators |
| 7 | 7 | Landscaping |
| 8 | 8 | Lighting |
| 9 | 9 | Plumbing |
| 10 | 10 | Rail |
| 11 | 11 | Safety |
| 12 | 12 | Site Equipment |
| 13 | 13 | Trailers |
| 14 | 14 | Vehicles |

- **CustomerTypeDIM_V1**

```
1  -- CustomerTypeDIM_V1
2  CREATE TABLE customertypedim_v1
3      AS
4          SELECT
5              customer_type_id AS customertypeid,
6              description      AS customertype_desc
7          FROM
8              customer_type;
```

|   | CUSTOMERTYPEID | CUSTOMERTYPE_DESC |
|---|---|---|
| 1 | 1 | Individual |
| 2 | 2 | Business |

- **PriceScaleDIM_V1**

```
-- PriceScaleDIM_V1
CREATE TABLE pricescaledim_v1 (
    scaleid          VARCHAR2(10),
    scale_desc       VARCHAR2(50),
    scale_lowerbound NUMBER(10),
    scale_upperbound NUMBER(10)
);

INSERT INTO pricescaledim_v1 VALUES (
    1,
    'LOW',
    0,
    4999
);

INSERT INTO pricescaledim_v1 VALUES (
    2,
    'MEDIUM',
    5000,
    10000
);

INSERT INTO pricescaledim_v1 VALUES (
    3,
    'HIGH',
    10001,
    power(10, 10) - 1
);
```

|   | SCALEID | SCALE_DESC | SCALE_LOWERBOUND | SCALE_UPPERBOUND |
|---|---|---|---|---|
| 1 | 1 | LOW | 0 | 4999 |
| 2 | 2 | MEDIUM | 5000 | 10000 |
| 3 | 3 | HIGH | 10001 | 9999999999 |

■ *HireFact_V1*

```sql
147 CREATE TABLE hirefact_v1
148     AS
149         SELECT
150             to_char(hi.start_date, 'YYYYMM') AS timeid,
151             CASE
152                 WHEN to_char(hi.start_date, 'MM') IN ( '12', '01', '02' ) THEN
153                     1
154                 WHEN to_char(hi.start_date, 'MM') BETWEEN '03' AND '05' THEN
155                     2
156                 WHEN to_char(hi.start_date, 'MM') BETWEEN '06' AND '08' THEN
157                     3
158                 WHEN to_char(hi.start_date, 'MM') BETWEEN '09' AND '11' THEN
159                     4
160             END                              AS seasonid,
161             eq.category_id                   AS categoryid,
162             ct.customer_type_id              AS customertypeid,
163             cb.branchid,
164             SUM(hi.total_hire_price)         AS totalhirerevenue,
165             COUNT(*)                         AS num_of_hired_transaction,
166             SUM(hi.quantity)                 AS num_of_hired_equip
167         FROM
168             hire hi
169             JOIN equipment          eq ON eq.equipment_id = hi.equipment_id
170             JOIN customer_clean     ct ON ct.customer_id = hi.customer_id
171             JOIN staff              st ON st.staff_id = hi.staff_id
172             JOIN companybranchdim_v1 cb ON cb.branch_desc = st.company_branch
173         GROUP BY
174             to_char(hi.start_date, 'YYYYMM'),
175             CASE
176                 WHEN to_char(hi.start_date, 'MM') IN ( '12', '01', '02' ) THEN
177                     1
178                 WHEN to_char(hi.start_date, 'MM') BETWEEN '03' AND '05' THEN
179                     2
180                 WHEN to_char(hi.start_date, 'MM') BETWEEN '06' AND '08' THEN
181                     3
```

| | TIMEID | SEASONID | CATEGORYID | CUSTOMERTYPEID | BRANCHID | TOTALHIREREVENUE | NUM_OF_HIRED_TRANSACTION | NUM_OF_HIRED_EQUIP |
|---|--------|----------|------------|----------------|----------|------------------|--------------------------|--------------------|
| 1 | 201805 | 2 | 5 | 1 | 14 | 4000 | 1 | 2 |
| 2 | 201807 | 3 | 9 | 1 | 4 | 80 | 1 | 2 |
| 3 | 201808 | 3 | 1 | 2 | 10 | 1440 | 1 | 2 |
| 4 | 201810 | 4 | 9 | 2 | 12 | 1260 | 1 | 1 |
| 5 | 201811 | 4 | 2 | 1 | 10 | 3200 | 1 | 2 |
| 6 | 201812 | 1 | 9 | 2 | 1 | 40 | 1 | 1 |
| 7 | 201812 | 1 | 1 | 1 | 11 | 890 | 1 | 1 |
| 8 | 201812 | 1 | 10 | 2 | 2 | 1560 | 1 | 3 |
| 9 | 201901 | 1 | 1 | 2 | 8 | 900 | 1 | 3 |
| 10 | 201903 | 2 | 10 | 1 | 14 | 480 | 1 | 1 |
| 11 | 201904 | 2 | 2 | 2 | 13 | 3000 | 1 | 3 |
| 12 | 201904 | 2 | 8 | 1 | 3 | 700 | 1 | 1 |
| 13 | 201905 | 2 | 5 | 1 | 5 | 1350 | 1 | 3 |
| 14 | 201905 | 2 | 3 | 1 | 10 | 1440 | 1 | 3 |
| 15 | 201906 | 3 | 7 | 2 | 2 | 3600 | 1 | 2 |
| 16 | 201906 | 3 | 8 | 2 | 7 | 600 | 1 | 3 |
| 17 | 201906 | 3 | 2 | 2 | 4 | 760 | 1 | 2 |
| 18 | 201907 | 3 | 5 | 2 | 13 | 675 | 1 | 3 |
| 19 | 201907 | 3 | 12 | 2 | 15 | 100 | 1 | 2 |

- ***SalesFact_V1***

```sql
191  CREATE TABLE salesfact_v1
192       AS
193          SELECT
194              to_char(sl.sales_date, 'yyyymm') AS timeid,
195              CASE
196                  WHEN to_char(sl.sales_date, 'mm') IN ( 12, 01, 02 ) THEN
197                      1
198                  WHEN to_char(sl.sales_date, 'mm') BETWEEN 03 AND 05 THEN
199                      2
200                  WHEN to_char(sl.sales_date, 'mm') BETWEEN 06 AND 08 THEN
201                      3
202                  WHEN to_char(sl.sales_date, 'mm') BETWEEN 09 AND 11 THEN
203                      4
204              END                          AS seasonid,
205              eq.category_id               AS categoryid,
206              ct.customer_type_id          AS customertypeid,
207              cb.branchid,
208              CASE
209                  WHEN sl.total_sales_price < 5000  THEN
210                      1
211                  WHEN sl.total_sales_price > 10000 THEN
212                      3
213                  ELSE
214                      2
215              END                          AS scaleid,
216              SUM(sl.total_sales_price)    AS totalsalesrevenue,
217              COUNT(*)                     AS num_of_sold_transaction,
218              SUM(sl.quantity)             AS num_of_sold_equip
219          FROM
220              sales sl
221              JOIN equipment          eq ON eq.equipment_id = sl.equipment_id
222              JOIN customer_clean     ct ON ct.customer_id = sl.customer_id
223              JOIN staff              st ON st.staff_id = sl.staff_id
224              JOIN companybranchdim_v1 cb ON cb.branch_desc = st.company_branch
225          GROUP BY
226              CASE
```

| | TIMEID | SEASONID | CATEGORYID | CUSTOMERTYPEID | BRANCHID | SCALEID | TOTALSALESREVENUE | NUM_OF_SOLD_TRANSACTION | NUM_OF_SOLD_EQUIP |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 201807 | 3 | 3 | 2 | 12 | 3 | 60000 | 1 | 3 |
| 2 | 201807 | 3 | 11 | 1 | 8 | 3 | 11200 | 1 | 2 |
| 3 | 201808 | 3 | 11 | 1 | 4 | 3 | 43200 | 1 | 2 |
| 4 | 201809 | 4 | 7 | 2 | 4 | 3 | 19200 | 1 | 2 |
| 5 | 201809 | 4 | 11 | 2 | 4 | 3 | 38400 | 1 | 4 |
| 6 | 201809 | 4 | 1 | 2 | 6 | 3 | 214500 | 1 | 3 |
| 7 | 201810 | 4 | 1 | 1 | 15 | 3 | 63000 | 1 | 2 |
| 8 | 201811 | 4 | 7 | 1 | 4 | 3 | 126000 | 1 | 2 |
| 9 | 201903 | 2 | 10 | 2 | 9 | 3 | 80000 | 1 | 2 |
| 10 | 201905 | 2 | 7 | 2 | 11 | 3 | 72800 | 1 | 4 |
| 11 | 201907 | 3 | 11 | 1 | 1 | 3 | 18000 | 1 | 2 |
| 12 | 201909 | 4 | 6 | 2 | 12 | 3 | 120000 | 1 | 4 |
| 13 | 201910 | 4 | 1 | 2 | 4 | 3 | 154050 | 1 | 3 |
| 14 | 201911 | 4 | 13 | 2 | 10 | 3 | 43200 | 1 | 3 |

**Star Schema Version 2**

■ **StaffDIM_V2**

```
-- StaffDIM_V2
CREATE TABLE staffdim_v2
   AS
      SELECT
         *
      FROM
         staff;
```

| | STAFF_ID | FIRST_NAME | LAST_NAME | GENDER | PHONE | EMAIL | COMPANY_BRANCH |
|---|---|---|---|---|---|---|---|
| 1 | 1 | Carleen | Razzell | Female | 323 545 5764 | carleen.razzell@monequip.com.au | Caulfield |
| 2 | 2 | Ailee | Paxeford | Female | 987 455 1555 | ailee.paxeford@monequip.com.au | Hughesdale |
| 3 | 3 | Elissa | Danovich | Female | 286 378 7209 | elissa.danovich@monequip.com.au | Clayton |
| 4 | 4 | Sonnnie | Chestnutt | Female | 245 231 1339 | sonnnie.chestnutt@monequip.com.au | Toorak |
| 5 | 5 | Mariska | Holtum | Female | 262 960 8943 | mariska.holtum@monequip.com.au | Clayton |
| 6 | 6 | Egbert | Earl | Male | 290 507 8778 | egbert.earl@monequip.com.au | Eltham |
| 7 | 7 | Marylinda | Chanders | Female | 398 888 9947 | marylinda.chanders@monequip.com.au | Chadstone |
| 8 | 8 | Marcella | Diggons | Female | 395 748 7317 | marcella.diggons@monequip.com.au | Docklands |
| 9 | 9 | Bethina | Gateman | Female | 891 703 6967 | bethina.gateman@monequip.com.au | Parkville |
| 10 | 10 | Felecia | Stobbart | Female | 735 724 1655 | felecia.stobbart@monequip.com.au | Caulfield |

■ **EquipmentDIM_V2**

```
--EquipmentDIM_V2
CREATE TABLE equipmentdim_v2
   AS
      SELECT
         *
      FROM
         equipment;
```

| | CUSTOMER_ID | CUSTOMER_TYPE_ID | NAME | GENDER | ADDRESS_ID | PHONE | EMAIL |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | Regina Isaacson | Female | 1 | 601 627 5878 | risaacson0@tamu.edu |
| 2 | 2 | 2 | Jaime Whate | Male | 2 | 318 998 0883 | jwhate1@ucoz.ru |
| 3 | 3 | 1 | Thaine Hirche | Male | 3 | 276 571 7986 | thirche2@reference.com |
| 4 | 4 | 1 | Deirdre Reddington | Female | 4 | 585 183 1946 | dreddington3@cloudflare.com |
| 5 | 5 | 1 | Domenic Kirrens | Male | 5 | 798 585 9171 | dkirrens4@virginia.edu |
| 6 | 6 | 1 | Kerk Petera | Male | 6 | 856 940 2206 | kpetera5@fastcompany.com |
| 7 | 7 | 1 | Pammie Futter | Female | 7 | 891 227 4556 | pfutter6@woothemes.com |
| 8 | 8 | 2 | Blaire Christopherson | Female | 8 | 872 144 2174 | bchristopherson7@photobucket.com |
| 9 | 9 | 1 | Gaye Kemmis | Female | 9 | 746 484 4734 | gkemmis8@vimeo.com |
| 10 | 10 | 2 | Cherise Alessandretti | Female | 10 | 501 251 3910 | calessandretti9@auda.org.au |
| 11 | 11 | 2 | Kimmi Deeks | Female | 11 | 128 972 8249 | kdeeksa@who.int |
| 12 | 12 | 1 | Leticia Braiden | Female | 12 | 367 506 7975 | lbraidenb@dailymail.co.uk |

■ **CustomerDIM_V2**

```
--CustomerDIM_V2
CREATE TABLE customerdim_v2
   AS
      SELECT
         *
      FROM
         customer_clean;
```

| | EQUIPMENT_ID | EQUIPMENT_NAME | EQUIPMENT_PRICE | MANUFACTURE_YEAR | MANUFACTURER | CATEGORY_ID |
|---|---|---|---|---|---|---|
| 1 | 1 | SCISSORLIFT 3.0M (10FT) MANUAL | 27000 | 2001 | Kenworth | 1 |
| 2 | 2 | MANLIFT 4.75M (15FT) SELF PROPELLED | 15750 | 2000 | Hitachi | 1 |
| 3 | 3 | SCISSORLIFT 5.8M (19FT) ELECTRIC | 10800 | 2008 | Volvo | 1 |
| 4 | 4 | SCISSORLIFT 5.8M (19FT) TRACKED BI-LEVELLING NARROW | 20540 | 2016 | Kobelco | 1 |
| 5 | 5 | SCISSORLIFT 7.7M (26FT) ELECTRIC NARROW | 15600 | 2007 | Yanmar | 1 |
| 6 | 6 | MOBILE HYDRAULIC PLATFORM 19M TRACKED | 35750 | 2013 | Caterpillar | 1 |
| 7 | 7 | MOBILE HYDRAULIC PLATFORM 9M TRACKED | 22200 | 2013 | Isuzu | 1 |
| 8 | 8 | MOBILE HYDRAULIC PLATFORM 12M | 25200 | 2005 | Volvo | 1 |
| 9 | 9 | BOOMLIFT 18M (60FT) DIESEL/ELECTRIC 4WD | 21600 | 2011 | Caterpillar | 1 |
| 10 | 10 | BOOMLIFT 9M (30FT) ELECTRIC | 20160 | 2014 | Kubota | 1 |
| 11 | 11 | BOOMLIFT 10.2M (34FT) DIESEL/ELECTRIC 4WD | 14400 | 2000 | Hitachi | 1 |
| 12 | 12 | MANLIFT 8M SELF PROPELLED | 14560 | 2009 | Komatsu | 1 |
| 13 | 13 | MANLIFT 6M (19FT) SELF PROPELLED | 30000 | 2010 | Volvo | 1 |
| 14 | 14 | AIR COMPRESSOR 2.1 CFM 12V | 780 | 2015 | Case | 2 |

- ***HireDIM_V2***

```
2   --HireDIM_V2
3 ⊟ CREATE TABLE hiredim_v2
4      AS
5          SELECT
6              hire_id,
7              start_date,
8              end_date,
9              quantity,
L              unit_hire_price,
2              total_hire_price
3          FROM
3              hire;
```

| | HIRE_ID | START_DATE | END_DATE | QUANTITY | UNIT_HIRE_PRICE | TOTAL_HIRE_PRICE |
|---|---|---|---|---|---|---|
| 1 | 1 | 11-MAY-18 | 14-MAY-18 | 3 | 80 | 720 |
| 2 | 2 | 17-MAY-18 | 20-MAY-18 | 2 | 660 | 3960 |
| 3 | 3 | 18-MAY-18 | 19-MAY-18 | 1 | 150 | 150 |
| 4 | 4 | 21-MAY-18 | 25-MAY-18 | 1 | 540 | 2160 |
| 5 | 5 | 21-MAY-18 | 23-MAY-18 | 2 | 600 | 2400 |
| 6 | 6 | 22-MAY-18 | 26-MAY-18 | 2 | 500 | 4000 |
| 7 | 7 | 24-MAY-18 | 28-MAY-18 | 3 | 140 | 1680 |
| 8 | 8 | 25-MAY-18 | 28-MAY-18 | 3 | 80 | 720 |
| 9 | 9 | 28-MAY-18 | 28-MAY-18 | 2 | 170 | 170 |
| 10 | 10 | 29-MAY-18 | 29-MAY-18 | 2 | 200 | 200 |

- ***SalesDIM_V2***

```
--SalesDIM_V2
⊟ CREATE TABLE salesdim_v2
     AS
         SELECT
             sales_id,
             sales_date,
             quantity,
             unit_sales_price,
             total_sales_price
         FROM
             sales;
```

| | SALES_ID | SALES_DATE | QUANTITY | UNIT_SALES_PRICE | TOTAL_SALES_PRICE |
|---|---|---|---|---|---|
| 1 | 1 | 09-APR-18 | 3 | 11000 | 33000 |
| 2 | 2 | 17-APR-18 | 2 | 9000 | 18000 |
| 3 | 3 | 10-MAY-18 | 2 | 41600 | 83200 |
| 4 | 4 | 05-JUN-18 | 2 | 9000 | 18000 |
| 5 | 5 | 06-JUL-18 | 4 | 65000 | 260000 |
| 6 | 6 | 07-JUL-18 | 1 | 63000 | 63000 |
| 7 | 7 | 09-JUL-18 | 1 | 19200 | 19200 |
| 8 | 8 | 09-JUL-18 | 4 | 84500 | 338000 |
| 9 | 9 | 10-JUL-18 | 3 | 54000 | 162000 |
| 10 | 10 | 10-JUL-18 | 4 | 54000 | 216000 |

- ***HiringFact_V2***

```
-- HiringFact_V2
⊟ CREATE TABLE hiringfact_v2
     AS
         SELECT
             st.staff_id,
             eq.equipment_id,
             hi.hire_id,
             cc.customer_id,
             SUM(hi.total_hire_price) AS totalhirerevenue
         FROM
                 hire hi
             JOIN staff         st ON st.staff_id = hi.staff_id
             JOIN equipment     eq ON eq.equipment_id = hi.equipment_id
             JOIN customer_clean cc ON cc.customer_id = hi.customer_id
         GROUP BY
             st.staff_id,
             eq.equipment_id,
             hi.hire_id,
             cc.customer_id;
```

| | STAFF_ID | EQUIPMENT_ID | HIRE_ID | CUSTOMER_ID | TOTALHIREREVENUE |
|---|---|---|---|---|---|
| 1 | 2 | 135 | 1 | 77 | 720 |
| 2 | 10 | 73 | 7 | 77 | 1680 |
| 3 | 44 | 125 | 23 | 19 | 420 |
| 4 | 47 | 10 | 27 | 99 | 1440 |
| 5 | 33 | 31 | 29 | 3 | 360 |
| 6 | 28 | 133 | 28 | 126 | 4800 |
| 7 | 42 | 112 | 37 | 81 | 680 |
| 8 | 48 | 86 | 53 | 129 | 200 |
| 9 | 36 | 138 | 64 | 13 | 45 |
| 10 | 2 | 23 | 65 | 32 | 3200 |

■ *SellingFact_V2*

```
--SellingFact_V2
CREATE TABLE sellingfact_v2
    AS
        SELECT
            st.staff_id,
            eq.equipment_id,
            sl.sales_id,
            cc.customer_id,
            SUM(sl.total_sales_price) AS totalsalesrevenue
        FROM
                sales sl
            JOIN staff          st ON st.staff_id = sl.staff_id
            JOIN equipment      eq ON eq.equipment_id = sl.equipment_id
            JOIN customer_clean cc ON cc.customer_id = sl.customer_id
        GROUP BY
            st.staff_id,
            eq.equipment_id,
            sl.sales_id,
            cc.customer_id;
```

| | STAFF_ID | EQUIPMENT_ID | SALES_ID | CUSTOMER_ID | TOTALSALESREVENUE |
|---|---|---|---|---|---|
| 1 | 21 | 5 | 57 | 84 | 156000 |
| 2 | 8 | 6 | 30 | 64 | 214500 |
| 3 | 16 | 20 | 84 | 120 | 91000 |
| 4 | 13 | 22 | 71 | 35 | 90000 |
| 5 | 35 | 25 | 138 | 70 | 198000 |
| 6 | 4 | 28 | 104 | 139 | 60000 |
| 7 | 5 | 29 | 68 | 87 | 52800 |
| 8 | 22 | 32 | 13 | 81 | 60000 |
| 9 | 11 | 41 | 133 | 49 | 40000 |
| 10 | 38 | 43 | 103 | 70 | 22500 |