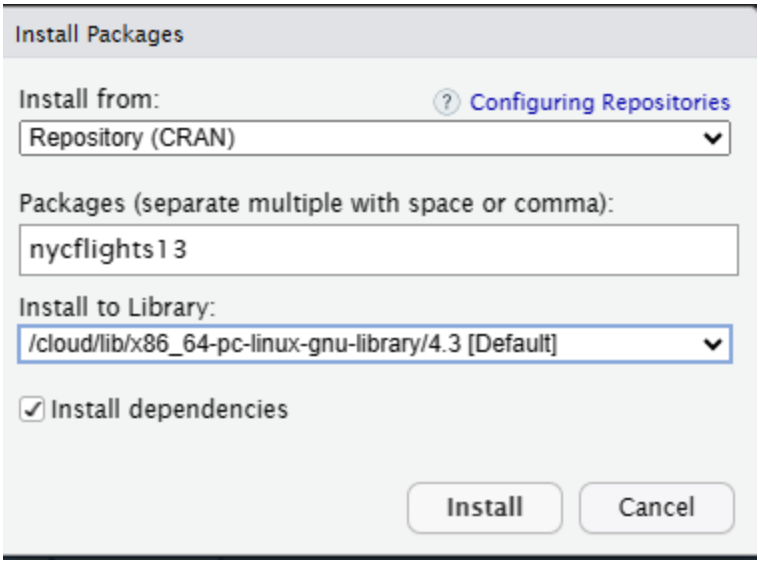
Project 3: Data Transformation

▼ Instruction for Homework

Assignment_Data_Trasform.R

- Load Package: `nycfilghts13`

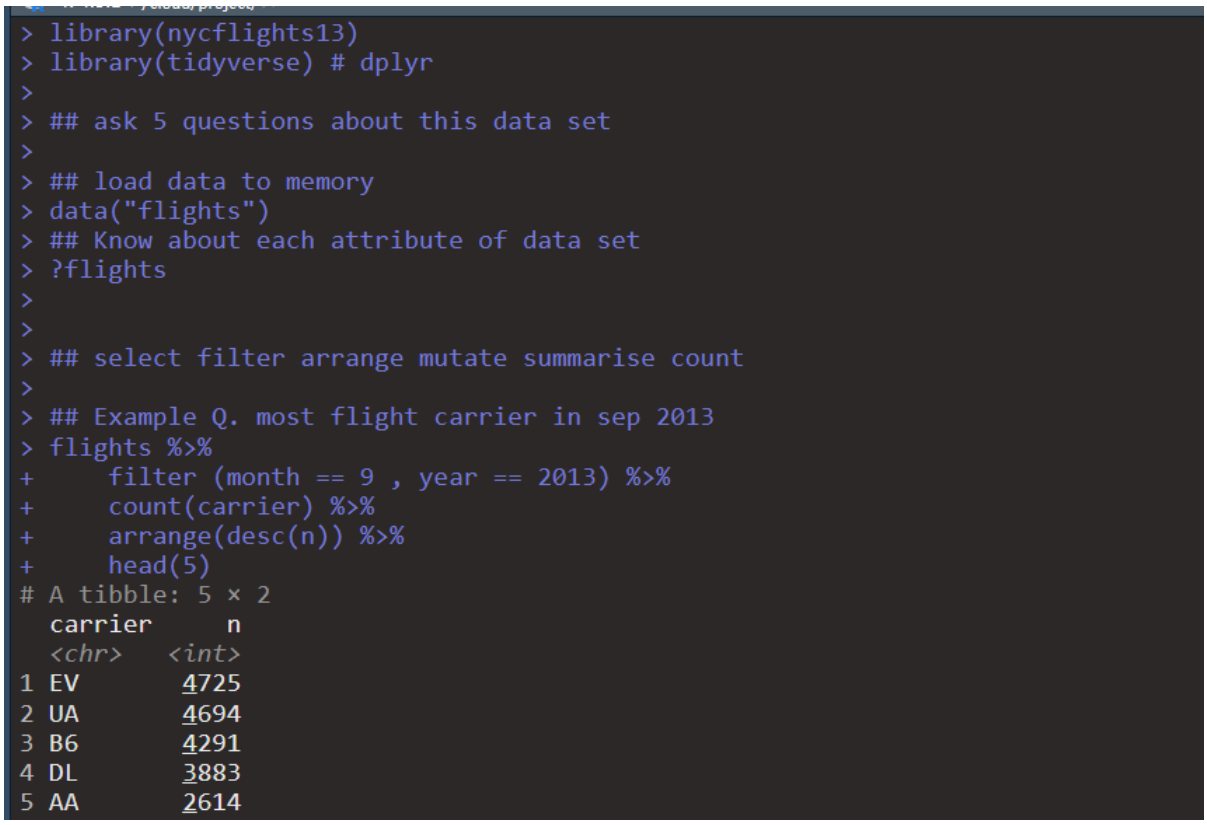


```
> install.packages("nycflights13")
Installing package into ‘/cloud/lib/x86_64-pc-linux-gnu-library/4.3’
(as ‘lib’ is unspecified)
trying URL 'http://rspm/default/__linux__/focal/latest/src/contrib/nycflights13_1.0.2.tar.gz'
Content type 'application/x-gzip' length 4506293 bytes (4.3 MB)
==================================================
downloaded 4.3 MB

* installing *binary* package ‘nycflights13’ ...
* DONE (nycflights13)

The downloaded source packages are in
        ‘/tmp/RtmpnmgEBd/downloaded_packages’
>
```

- Load Library 2 ตัว
  - nycflights13
  - tidyverse
- Create Question 5 Questions by using select, filter, arrange, mutate, summarise, count

```
## homework

## transform nycflights13

library(nycflights13)
library(tidyverse) # dplyr

## ask 5 questions about this data set

## load data to memory
data("flights")
## Abbr. Airline
data("airlines")
## Know about each attribute of data set
?flights


## select filter arrange mutate summarise count

## Example Q. most flight carrier in sep 2013
```

```
flights %>%
    filter (month == 9 , year == 2013) %>%
    count(carrier) %>%
    arrange(desc(n)) %>%
    head(5)
```



```
> library(nycflights13)
> library(tidyverse) # dplyr
>
> ## ask 5 questions about this data set
>
> ## load data to memory
> data("flights")
> ## Know about each attribute of data set
> ?flights
>
>
> ## select filter arrange mutate summarise count
>
> ## Example Q. most flight carrier in sep 2013
> flights %>%
+     filter (month == 9 , year == 2013) %>%
+     count(carrier) %>%
+     arrange(desc(n)) %>%
+     head(5)
# A tibble: 5 × 2
  carrier     n
  <chr>   <int>
1 EV       4725
2 UA       4694
3 B6       4291
4 DL       3883
5 AA       2614
```

🚀 Detail of Data Set - flights by using command in console : `?flights`

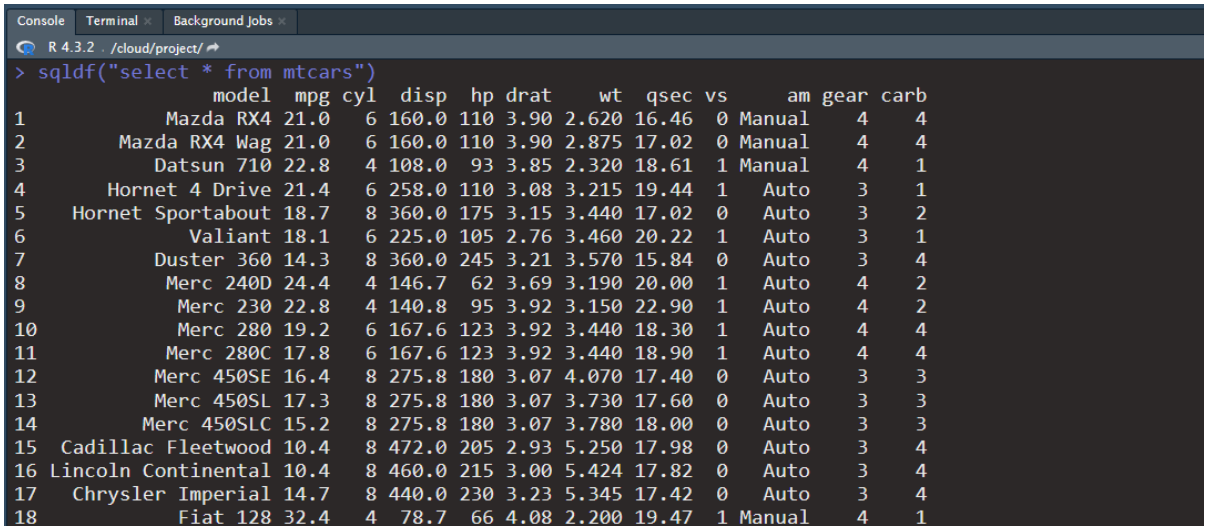
```
flights {nycflights13}  R Documentation
Flights data
Description
On-time data for all flights that departed NYC (i.e. JFK, LGA
in 2013.

Usage
```

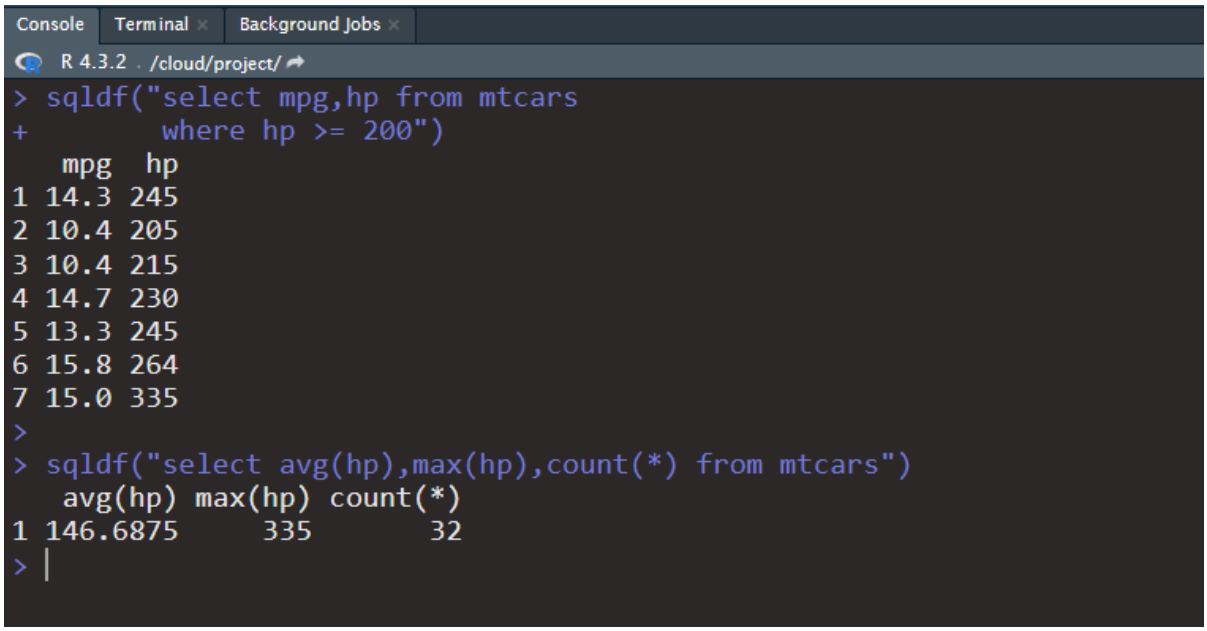
```
flights
Format
Data frame with columns

year, month, day
Date of departure.

dep_time, arr_time
Actual departure and arrival times (format HHMM or HMM), loca

sched_dep_time, sched_arr_time
Scheduled departure and arrival times (format HHMM or HMM), l

dep_delay, arr_delay
Departure and arrival delays, in minutes. Negative times repr
early departures/arrivals.

carrier
Two letter carrier abbreviation. See airlines to get name.

flight
Flight number.

tailnum
Plane tail number. See planes for additional metadata.

origin, dest
Origin and destination. See airports for additional metadata.

air_time
Amount of time spent in the air, in minutes.

distance
Distance between airports, in miles.

hour, minute
```

```
Time of scheduled departure broken into hour and minutes.

time_hour
Scheduled date and hour of the flight as a POSIXct date.
Along with origin, can be used to join flights data to weathe

Source
RITA, Bureau of transportation statistics,
https://www.transtats.bts.gov/DL_SelectFields.asp?Table_ID=23
```

🌵 `Tip :` ถ้าใครถนัด SQL Statement ต้อง load `Package : sqldf` และ ใช้ `library : sqldf`

```
### Package : sqldf
install.packages("sqldf")
library(sqldf)

sqldf("select * from mtcars")

sqldf("select mpg,hp from mtcars
       where hp >= 200")

sqldf("select avg(hp),max(hp),count(*) from mtcars")
```



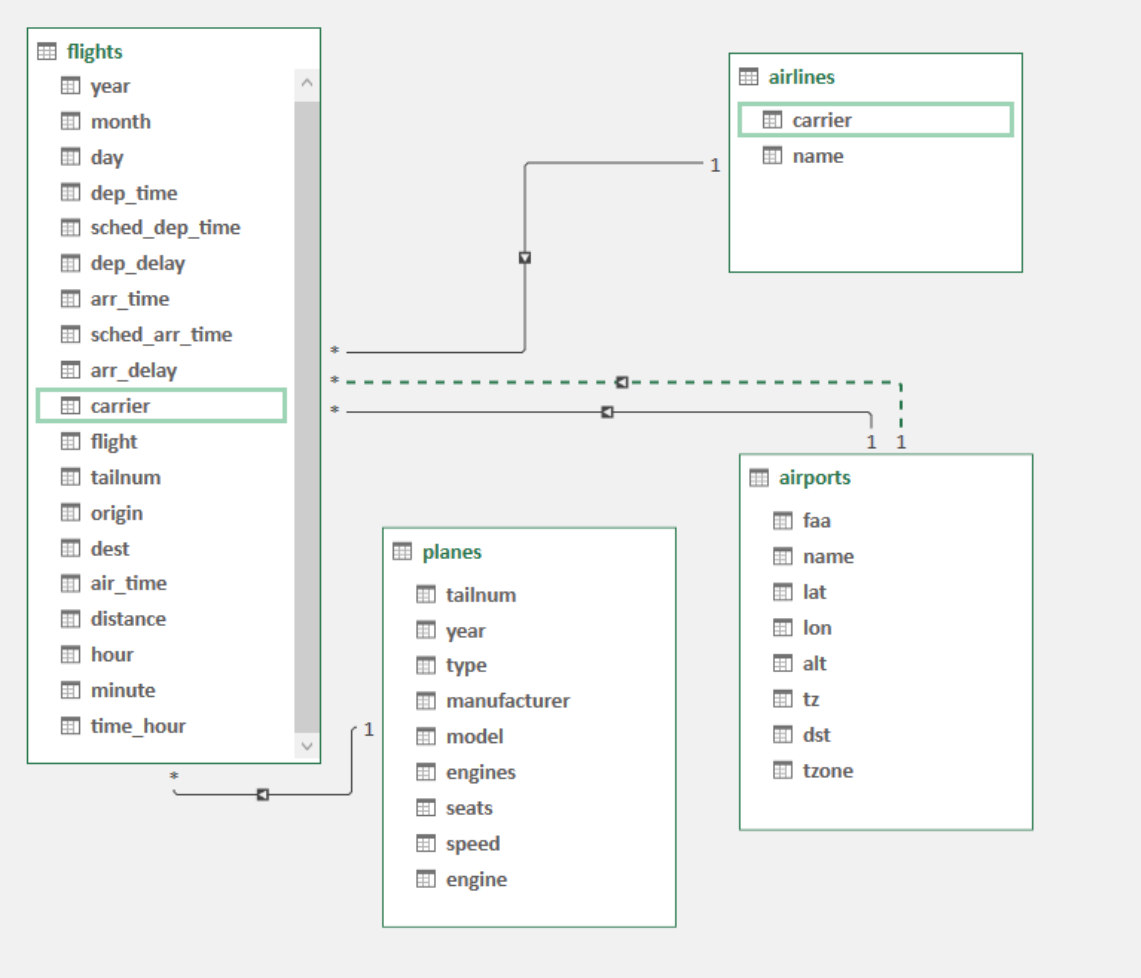


▼ Assign Homework (HW1)

- HW 1 - Create SQL from a data set of `nycflights13`
  - 5 Questions by using select, filter, summarise, mutate, arrange, count()

> 🚀 About Data Set

- Select 4 Data Sets that are
  - Flights Data (`flights`): on-time data for all flights that departed NYC (i.e. JFK, LGA or EWR) in 2013
  - Airline names (`airlines`): Look up airline names from their carrier codes.
  - Airport metadata (`airports`): Useful metadata about airports.
  - Plane metadata(`planes`): Plane metadata for all plane tail numbers found in the FAA aircraft registry. American Airway (AA) and Envoy Air (MQ) report fleet numbers rather than tail numbers so can’t be matched.



[Example Data : Project_Data_Transform.csv]

🚀 Preparing Environment - load Library

```
## homework

## transform nycflights13

library(nycflights13)
library(tidyverse) # dplyr
```

```
## Ask 5 questions about this data set

## Load data to memory
data("flights")
## Know about each attribute of the data set
?flights
```

Example: Assignment_Data_Trasform_R

Assignment1_Q1_5.R

🚀 `Q1`: In month 9, which manufacturer uses airplanes the most? list the Top 10 companies.

```
flights %>%
   filter (month == 9) %>%
   inner_join(planes,by = "tailnum") %>%
   group_by(month,manufacturer) %>%
   summarise(cnt = n()) %>%
   arrange(desc(cnt)) %>%
   head(10)
```

🌿🍀☘ **Result Set**

```
> ## select filter arrange mutate summarise count
>
> ## Q1 : In month = 9, which manufacturer uses airplanes the most? Top 10 companies.
>
> flights %>%
+    filter (month == 9) %>%
+    inner_join(planes,by = "tailnum") %>%
+    group_by(month,manufacturer) %>%
+    summarise(cnt = n()) %>%
+    arrange(desc(cnt)) %>%
+    head(10)
`summarise()` has grouped output by 'month'. You can override using the `.groups` argument.
# A tibble: 10 × 3
# Groups:   month [1]
   month manufacturer                  cnt
   <int> <chr>                       <int>
 1     9 BOEING                       6425
 2     9 EMBRAER                      5343
 3     9 AIRBUS                       3872
 4     9 AIRBUS INDUSTRIE             3516
 5     9 BOMBARDIER INC               2786
 6     9 MCDONNELL DOUGLAS AIRCRAFT CO  657
 7     9 MCDONNELL DOUGLAS              344
 8     9 CANADAIR                       148
 9     9 MCDONNELL DOUGLAS CORPORATION   84
10     9 CESSNA                          73
>
```

🚀 `Q2:` Summarize the number of flights in each airline for month 9.

```
flights %>%
  filter (month == 9) %>%
  inner_join(airlines,by = "carrier") %>%
  group_by(carrier,name) %>%
  summarise(cnt = n()) %>%
  arrange(desc(cnt))
```

🌿🍀☘️ Result Set

```
> ## Q2 : summarize number of flight in each airline of month 9
> flights %>%
+   filter (month == 9) %>%
+   inner_join(airlines,by = "carrier") %>%
+   group_by(carrier,name) %>%
+   summarise(cnt = n()) %>%
+   arrange(desc(cnt))
`summarise()` has grouped output by 'carrier'. You can override using the `.groups`
argument.
# A tibble: 16 × 3
# Groups:   carrier [16]
   carrier name                        cnt
   <chr>   <chr>                     <int>
 1 EV      ExpressJet Airlines Inc.   4725
 2 UA      United Air Lines Inc.      4694
 3 B6      JetBlue Airways            4291
 4 DL      Delta Air Lines Inc.       3883
 5 AA      American Airlines Inc.     2614
 6 MQ      Envoy Air                  2206
 7 US      US Airways Inc.            1698
 8 9E      Endeavor Air Inc.          1540
 9 WN      Southwest Airlines Co.     1010
10 VX      Virgin America              453
11 FL      AirTran Airways Corporation 255
12 AS      Alaska Airlines Inc.         60
13 F9      Frontier Airlines Inc.       58
14 YV      Mesa Airlines Inc.           42
15 HA      Hawaiian Airlines Inc.       25
16 OO      SkyWest Airlines Inc.        20
>
```

🚀 `Q3:` Identify the top 10 airplane types and manufacturers that have the maximum total distance and the total amount of time spent in the air.

```
flights %>%
  filter (year == 2013) %>%
  inner_join(planes,by = "tailnum") %>%
  group_by (manufacturer, type, engine) %>%
  summarise(Total_distance    = sum(distance,na.rm = TRUE),
            Total_AirTime_min = sum(air_time,na.rm= TRUE),
            Total_AirTime_hr  = round(sum(air_time,na.rm= TRU
            cnt = n()) %>%
  arrange(desc(Total_distance)) %>%
  head(10)
```

🌿🍀☘ Result Set

```
> ## Q3 : Identify the top 10 types of airplanes and manufacturers that have the maximum total distance and the tota
l amount of time spent in the air
>   flights %>%
+   filter (year == 2013) %>%
+   inner_join(planes,by = "tailnum") %>%
+   group_by (manufacturer,type,engine) %>%
+   summarise(Total_distance = sum(distance,na.rm = TRUE),
+             Total_AirTime_min = sum(air_time,na.rm= TRUE),
+             Total_AirTime_hr = round(sum(air_time,na.rm= TRUE)/60,2),
+             cnt = n()) %>%
+   arrange(desc(Total_distance)) %>%
+   head(10)
`summarise()` has grouped output by 'manufacturer', 'type'. You can override using the
`.groups` argument.
# A tibble: 10 × 7
# Groups:   manufacturer, type [8]
   manufacturer          type  engine Total_distance Total_AirTime_min Total_AirTime_hr   cnt
   <chr>                 <chr> <chr>           <dbl>             <dbl>            <dbl> <int>
 1 BOEING                Fixe… Turbo…       81196481          11198044          186634. 55292
 2 AIRBUS                Fixe… Turbo…       66963735           9142196          152370. 46705
 3 BOEING                Fixe… Turbo…       48583727           6569012          109484. 27620
 4 EMBRAER               Fixe… Turbo…       34462616           5370694           89512. 65794
 5 AIRBUS INDUSTRIE      Fixe… Turbo…       29703497           4277392           71290. 30379
 6 BOMBARDIER INC        Fixe… Turbo…       14990924           2341640           39027. 28272
 7 AIRBUS INDUSTRIE      Fixe… Turbo…       10414105           1509103           25152. 10512
 8 MCDONNELL DOUGLAS AI… Fixe… Turbo…        8156412           1172515           19542.  8932
 9 MCDONNELL DOUGLAS     Fixe… Turbo…        3751769            538464            8974.  3873
10 MCDONNELL DOUGLAS CO… Fixe… Turbo…        1141928            165057            2751.  1259
```

🚀 `Q4:` Create a New Column speed_mph and summarize the top 10 of the mean speed for each airline company.

```
flights %>%
   filter (year == 2013) %>%
   mutate (speed_mph = distance / (hour + (minute/60))) %>%
   inner_join(airlines,by = "carrier") %>%
   group_by(name,origin,dest) %>%
   summarise(mean_speed = mean(speed_mph)) %>%
   arrange(name,desc(mean_speed)) %>%
   head(10)
```

🌿🍀☘️ Result Set

```
> ## Q4 : Create New Column speed_mph and Summarize mean speed for each airline company (Only Top 10 Row )
>   flights %>%
+     filter (year == 2013) %>%
+     mutate (speed_mph = distance / (hour + (minute/60))) %>%
+     inner_join(airlines,by = "carrier") %>%
+     group_by(name,origin,dest) %>%
+     summarise(mean_speed = mean(speed_mph)) %>%
+     arrange(name,desc(mean_speed)) %>%
+     head(10)
`summarise()` has grouped output by 'name', 'origin'. You can override using the `.groups`
argument.
# A tibble: 10 × 4
# Groups:   name, origin [3]
   name                       origin dest  mean_speed
   <chr>                      <chr>  <chr>      <dbl>
 1 AirTran Airways Corporation LGA    MKE        101.
 2 AirTran Airways Corporation LGA    ATL         65.4
 3 AirTran Airways Corporation LGA    CAK         28.1
 4 Alaska Airlines Inc.        EWR    SEA        227.
 5 American Airlines Inc.      JFK    SFO        224.
 6 American Airlines Inc.      JFK    LAS        211.
 7 American Airlines Inc.      JFK    STT        203.
 8 American Airlines Inc.      JFK    LAX        195.
 9 American Airlines Inc.      JFK    SJU        159.
10 American Airlines Inc.      JFK    SAN        140.
```

🚀 `Q5:` Which airline has the least delay time, ranked from the least to the most?

```
flights %>%
   filter (year == 2013) %>%
   inner_join(airlines,by = "carrier") %>%
   group_by(name) %>%
   summarise(Total_Delay = sum(dep_delay,na.rm = TRUE)) %>%
   arrange(Total_Delay) %>%
   head(10)
```

🌿🍀☘ Result Set

```
> ## Q5 : Which airports have the minimum delay time, arranged in descending order?
> flights %>%
+    filter (year == 2013) %>%
+    inner_join(airlines,by = "carrier") %>%
+    group_by(name) %>%
+    summarise(Total_Delay = sum(dep_delay,na.rm = TRUE)) %>%
+    arrange(Total_Delay) %>%
+    head(10)
# A tibble: 10 × 2
   name                       Total_Delay
   <chr>                            <dbl>
 1 SkyWest Airlines Inc.              365
 2 Hawaiian Airlines Inc.            1676
 3 Alaska Airlines Inc.              4133
 4 Mesa Airlines Inc.               10353
 5 Frontier Airlines Inc.           13787
 6 AirTran Airways Corporation      59680
 7 Virgin America                   66033
 8 US Airways Inc.                  75168
 9 Southwest Airlines Co.          214011
10 Envoy Air                       265521
>
```

▼ Assign Homework (HW2)

- HW 2 - Restaurant pizza SQL
  - create 3 - 5 data frames ⇒ write table into server.

> 🚀 Preparing Pizza Project convert to PostgresDB

- Script from SQLListDB()

> pizza.db

- Import DB to postit

> 🚀 Script Transform to PostgreSQL

> Assigment2_MigrateToPost.R

```
## Connect db
library(RPostgreSQL)
library(RSQLite)
library(glue)
library(tidyverse)

## create connection to sqlite.db file
con <- dbConnect(SQLite(),"pizza.db")
con_pros <- dbConnect(
        PostgreSQL(),
        host = "floppy.db.elephantsql.com",
        dbname = "tuhylmkl",
        user = "tuhylmkl",
        password = "QHYXeMm5-MPB6hEvb9F7FBlus_Q0bPKL",
        port = 5432)
##list Table
dbListTables(con)
dbListTables(con_pros)

##list fields/columns

dbListFields(con,"CUSTOMER")
dbListFields(con,"country")
dbListFields(con,"Ingredient")
dbListFields(con,"Menu_Pizza")
dbListFields(con,"ORDERS")
dbListFields(con,"Order_Pizza")
dbListFields(con,"Pizza_Ingredient")


## get data from database tables

customer <- data.frame(dbGetQuery(con, "select * from custome
country <- data.frame(dbGetQuery(con, "select * from country"
ingredient <- data.frame(dbGetQuery(con, "select * from Ingre
```

```
menu_Pizza <- data.frame(dbGetQuery(con, "select * from Menu_
orders <- data.frame(dbGetQuery(con, "select * from ORDERS"))
order_pizza <- data.frame(dbGetQuery(con, "select * from Orde
pizza_ingredient <- data.frame(dbGetQuery(con, "select * from

## write table to database
dbWriteTable(con_pros,"customer",customer)
dbWriteTable(con_pros,"country",country)
dbWriteTable(con_pros,"ingredient",ingredient)
dbWriteTable(con_pros,"menu_pizza",menu_Pizza)
dbWriteTable(con_pros,"orders",orders)
dbWriteTable(con_pros,"order_pizza",orders)
dbWriteTable(con_pros,"pizza_ingredient",orders)

dbListTables(con_pros)

dbGetQuery(con_pros, "select * from customer")
dbGetQuery(con_pros, "select * from country")
dbGetQuery(con_pros, "select * from ingredient")
dbGetQuery(con_pros, "select * from menu_pizza")
dbGetQuery(con_pros, "select * from orders")
dbGetQuery(con_pros, "select * from order_pizza")
dbGetQuery(con_pros, "select * from pizza_ingredient")


dbDisconnect(con)
dbDisconnect(con_pros)
```

🌿🍀☘ Result Set

```
> ## Connect db
> library(RPostgreSQL)
> library(RSQLite)
> library(glue)
> library(tidyverse)
>
> ## create connection to sqlite.db file
> con <- dbConnect(SQLite(),"pizza.db")
> con_pros <- dbConnect(
+         PostgreSQL(),
+         host = "floppy.db.elephantsql.com",
+         dbname = "tuhylmkl",
+         user = "tuhylmkl",
+         password = "QHYXeMm5-MPB6hEvb9F7FBlus_Q0bPKL",
+         port = 5432)
> ##list Table
> dbListTables(con)
[1] "CUSTOMER"         "Country"          "Ingredient"       "Menu_Pizza"       "ORDERS"
[6] "Order_Pizza"      "Pizza_Ingredient"
> dbListTables(con_pros)
character(0)
>
```

```
> ##list fields/columns
>
> dbListFields(con,"CUSTOMER")
[1] "CustomerID"         "CustNm"             "email"              "BirthDate"          "Customer_CountryID"
> dbListFields(con,"country")
[1] "CountryID" "CountryNm"
> dbListFields(con,"Ingredient")
[1] "IngredID"        "IngredName"      "No_Stock_Remain" "Min_Stock"
> dbListFields(con,"Menu_Pizza")
[1] "PizzaID"        "Pizza_Desc"     "Price_Per_Each"
> dbListFields(con,"ORDERS")
[1] "OrderID"       "OrderDate"     "CustomerID"    "Total_Amount"  "Delivery_Type"
> dbListFields(con,"Order_Pizza")
[1] "OrderID" "PizzaID"
> dbListFields(con,"Pizza_Ingredient")
[1] "PizzaID"  "IngredID"
>
```

```
> ## get data from database tables
>
> customer <- data.frame(dbGetQuery(con, "select * from customer"))
> country <- data.frame(dbGetQuery(con, "select * from country"))
> ingredient <- data.frame(dbGetQuery(con, "select * from Ingredient"))
> menu_Pizza <- data.frame(dbGetQuery(con, "select * from Menu_Pizza"))
> orders <- data.frame(dbGetQuery(con, "select * from ORDERS"))
> order_pizza <- data.frame(dbGetQuery(con, "select * from Order_Pizza"))
> pizza_ingredient <- data.frame(dbGetQuery(con, "select * from Pizza_Ingredient"))
>
> ## write table to database
> dbWriteTable(con_pros,"customer",customer)
[1] TRUE
> dbWriteTable(con_pros,"country",country)
[1] TRUE
> dbWriteTable(con_pros,"ingredient",ingredient)
[1] TRUE
> dbWriteTable(con_pros,"menu_pizza",menu_Pizza)
[1] TRUE
> dbWriteTable(con_pros,"orders",orders)
[1] TRUE
> dbWriteTable(con_pros,"order_pizza",orders)
[1] TRUE
> dbWriteTable(con_pros,"pizza_ingredient",orders)
[1] TRUE
>
> dbListTables(con_pros)
[1] "customer"         "country"          "ingredient"       "order_pizza"      "menu_pizza"
[6] "orders"           "pizza_ingredient"
>
```

```
> dbGetQuery(con_pros, "select * from customer")
  row.names CustomerID CustNm            email  BirthDate Customer_CountryID
1         1          1  Jenny  jenny@gmail.com 01/01/2000                  1
2         2          2  Henry  Henry@gmail.com 10/05/1996                  2
3         3          3  Marry  Marry@gmail.com 27/12/1900                  3
4         4          4   John   John@gmail.com 10/04/1997                  1
5         5          5  Jeffy  Jeffy@gmail.com 10/05/2002                  3
6         6          6  Gammy  Gammy@gmail.com 20/06/2019                  2
7         7          7   Anna   Anna@gmail.com 01/02/1997                  4
8         8          8 Pakpum Pakpum@gmail.com 20/08/1995                  1
9         9          9 Creamy Creamy@gmail.com 10/05/1994                  2
> dbGetQuery(con_pros, "select * from country")
  row.names CountryID CountryNm
1         1         1 Thailand
2         2         2    Canada
3         3         3     Japan
4         4         4       USA
> dbGetQuery(con_pros, "select * from ingredient")
  row.names IngredID IngredName No_Stock_Remain Min_Stock
1         1   Ing001      Onion              20         5
2         2   Ing002        Ham              10         3
3         3   Ing003   Mushroom              25         2
4         4   Ing004      Bacon              40        10
5         5   Ing005     Chilli              10         2
6         6   Ing006    Sausage              60         5
7         7   Ing007  Pineapple              40         3
```

```
> dbGetQuery(con_pros, "select * from menu_pizza")
  row.names PizzaID      Pizza_Desc Price_Per_Each
1         1  Pizza1       Pizza Art            250
2         2  Pizza2    Cheesy Pizza            650
3         3  Pizza3     Yummy Pizza            890
4         4  Pizza4   Healthy Pizza            255
5         5  Pizza5      Pizza Oven            235
6         6  Pizza6     Bacon Pizza            650
7         7  Pizza7   Cooking Pizza            235
8         8  Pizza8 Homemade Pizza            125
9         9  Pizza9      Good Pizza            250
```

```
> dbGetQuery(con_pros, "select * from orders")
   row.names OrderID  OrderDate CustomerID Total_Amount Delivery_Type
1          1    O001 11/05/2002          4          890      At Store
2          2    O002 20/06/2002          5          700      Delivery
3          3    O003 30/04/2002          6          650      Delivery
4          4    O004 05/06/2002          6         1020      Delivery
5          5    O005 15/03/2001          3          650      At Store
6          6    O006 16/07/2002          2          780      Delivery
7          7    O007 10/04/2001          9          900      Delivery
8          8    O008 06/08/2002          6          660      At Store
9          9    O009 10/03/2002          8          800      Delivery
10        10    O010 25/04/2001          7         1200      At Store
11        11    O011 30/05/2002          2          450      At Store
12        12    O012 07/08/2001          1          600      At Store
13        13    O013 05/09/2002          3          750      At Store
14        14    O014 08/05/2002          8          900      Delivery
15        15    O015 06/04/2002          4         1200      Delivery
```

```
> dbGetQuery(con_pros, "select * from order_pizza")
   row.names OrderID  OrderDate CustomerID Total_Amount Delivery_Type
1          1    O001 11/05/2002          4          890      At Store
2          2    O002 20/06/2002          5          700      Delivery
3          3    O003 30/04/2002          6          650      Delivery
4          4    O004 05/06/2002          6         1020      Delivery
5          5    O005 15/03/2001          3          650      At Store
6          6    O006 16/07/2002          2          780      Delivery
7          7    O007 10/04/2001          9          900      Delivery
8          8    O008 06/08/2002          6          660      At Store
9          9    O009 10/03/2002          8          800      Delivery
10        10    O010 25/04/2001          7         1200      At Store
11        11    O011 30/05/2002          2          450      At Store
12        12    O012 07/08/2001          1          600      At Store
13        13    O013 05/09/2002          3          750      At Store
14        14    O014 08/05/2002          8          900      Delivery
15        15    O015 06/04/2002          4         1200      Delivery
```

```
> dbGetQuery(con_pros, "select * from pizza_ingredient")
   row.names OrderID  OrderDate CustomerID Total_Amount Delivery_Type
1          1    O001 11/05/2002          4          890      At Store
2          2    O002 20/06/2002          5          700      Delivery
3          3    O003 30/04/2002          6          650      Delivery
4          4    O004 05/06/2002          6         1020      Delivery
5          5    O005 15/03/2001          3          650      At Store
6          6    O006 16/07/2002          2          780      Delivery
7          7    O007 10/04/2001          9          900      Delivery
8          8    O008 06/08/2002          6          660      At Store
9          9    O009 10/03/2002          8          800      Delivery
10        10    O010 25/04/2001          7         1200      At Store
11        11    O011 30/05/2002          2          450      At Store
12        12    O012 07/08/2001          1          600      At Store
13        13    O013 05/09/2002          3          750      At Store
14        14    O014 08/05/2002          8          900      Delivery
15        15    O015 06/04/2002          4         1200      Delivery
> dbListTables(con_pros)
[1] "customer"         "country"          "ingredient"       "order_pizza"      "menu_pizza"
[6] "orders"           "pizza_ingredient"
>
```