Practicum 1

Connect to Server

```
# 1. Library
library(RMySQL)
```

```
## Loading required package: DBI
```

```
# 2. Settings
db_user <- 'root'
db_password <- '1290'
db_name <- 'birdstrike'
db_table <- 'courses'
db_host <- 'localhost'
db_port <- 3306

# 3. Read data from db
mydb <-  dbConnect(MySQL(), user = db_user, password = db_password,
                 dbname = db_name, host = db_host, port = db_port)
```

Create Tables

```
DROP TABLE IF EXISTS Birds
```

```
create table Birds(
  Bird_ID INTEGER NOT NULL PRIMARY KEY AUTO_INCREMENT,
  Species VARCHAR(80) UNIQUE DEFAULT 'Unknown Bird',
  size ENUM('Small', 'Medium', 'Large', 'Not Available') DEFAULT 'Not Available'
);
```

```
DROP TABLE IF EXISTS Aircraft
```

```
create table Aircraft(
  Aircraft_ID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
  Model VARCHAR(100) UNIQUE DEFAULT 'Not Available',
  Engines Numeric DEFAULT NULL
);
```

```
DROP TABLE IF EXISTS Airport
```

```
create table Airport(
  Airport_ID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
  Airport_Name VARCHAR(100) UNIQUE DEFAULT 'Not Available',
  Origin VARCHAR(100) DEFAULT 'Not Available'
);
```

```
DROP TABLE IF EXISTS Record
```

```
create table Record (
  Record_ID Numeric NOT NULL PRIMARY KEY,
  Airport_ID INT DEFAULT NULL,
  Aircraft_ID INT DEFAULT NULL,
  Airport_Name VARCHAR(100),
  Aircraft_Name VARCHAR(50),
  Origin VARCHAR(50),
  Species VARCHAR(50),
  Flight_Date DATE DEFAULT NULL,
  Airline VARCHAR(50) DEFAULT 'Not Available',
  Indicated_Damage ENUM('No damage', 'Caused damage', 'Not Available') DEFAULT 'Not Available',
  Flight_Impact ENUM('None', 'Aborted Take-off', 'Precautionary Landing', 'Engine Shut Down', 'Other',
  Phase ENUM('Take-off run', 'Climb', 'Approach', 'Landing Roll', 'Descent', 'Taxi', 'Not Available') DE
  Remarks TEXT,
  Altitude NUMERIC CHECK(Altitude >= 0) DEFAULT NULL,
  Cost NUMERIC CHECK(Cost >= 0) DEFAULT NULL,
  Pilot_Warned ENUM('Y', 'N', 'Not Available') DEFAULT 'Not Available',
  Sky ENUM('No Cloud', 'Some Cloud', 'Overcast', 'Not Available') DEFAULT 'Not Available',
  Precipitation ENUM('Fog', 'Rain', 'Snow', 'Fog, Rain', 'Rain, Snow', 'Fog, Snow', 'Fog, Rain, Snow',
  Bird_ID INTEGER DEFAULT NULL,
  Number_Injured Integer CHECK(Number_Injured >= 0),
  FOREIGN KEY (Bird_ID) REFERENCES Birds(Bird_ID),
  FOREIGN KEY (Airport_ID) REFERENCES Airport(Airport_ID),
  FOREIGN KEY (Aircraft_ID) REFERENCES Aircraft(Aircraft_ID)
);
```

##Q3) READING DATA

```
mydata = read.csv("C:\\Users\\Owner\\Downloads\\BirdStrikesData.csv")  # read csv file
head(mydata)
```

```
##   ï..Record.ID Aircraft..Type              Airport..Name Altitude.bin
## 1       202152       Airplane               LAGUARDIA NY    > 1000 ft
## 2       208159       Airplane DALLAS/FORT WORTH INTL ARPT    < 1000 ft
## 3       207601       Airplane           LAKEFRONT AIRPORT    < 1000 ft
## 4       215953       Airplane         SEATTLE-TACOMA INTL    < 1000 ft
## 5       219878       Airplane                NORFOLK INTL    < 1000 ft
## 6       218432       Airplane         GUAYAQUIL/S BOLIVAR    < 1000 ft
##   Aircraft..Make.Model Wildlife..Number.struck Wildlife..Number.Struck.Actual
## 1            B-737-400               Over 100                            859
## 2                MD-80               Over 100                            424
## 3                C-500               Over 100                            261
## 4            B-737-400               Over 100                            806
## 5         CL-RJ100/200               Over 100                            942
```

```
## 6               A-300               Over 100                           537
##   Effect..Impact.to.flight      FlightDate Effect..Indicated.Damage
## 1         Engine Shut Down 11/23/2000 0:00            Caused damage
## 2                     None  7/25/2001 0:00            Caused damage
## 3                     None  9/14/2001 0:00                No damage
## 4    Precautionary Landing   9/5/2002 0:00                No damage
## 5                     None  6/23/2003 0:00                No damage
## 6                     None  7/24/2003 0:00                No damage
##   Aircraft..Number.of.engines. Aircraft..Airline.Operator Origin.State
## 1                            2                US AIRWAYS*     New York
## 2                            2          AMERICAN AIRLINES        Texas
## 3                            2                   BUSINESS    Louisiana
## 4                            2             ALASKA AIRLINES   Washington
## 5                            2             COMAIR AIRLINES     Virginia
## 6                            2          AMERICAN AIRLINES          N/A
##   When..Phase.of.flight Conditions..Precipitation
## 1                Climb                      None
## 2          Landing Roll                      None
## 3             Approach                       None
## 4                Climb                      None
## 5             Approach                       None
## 6          Take-off run                      None
##   Remains.of.wildlife.collected. Remains.of.wildlife.sent.to.Smithsonian
## 1                          FALSE                                   FALSE
## 2                          FALSE                                   FALSE
## 3                          FALSE                                   FALSE
## 4                           TRUE                                   FALSE
## 5                          FALSE                                   FALSE
## 6                          FALSE                                   FALSE
##
## 1  FLT 753. PILOT REPTD A HUNDRED BIRDS ON UNKN TYPE. #1 ENG WAS SHUT DOWN AND DIVERTED TO EWR. SLIG
## 2
## 3
## 4 NOTAM WARNING. 26 BIRDS HIT THE A/C, FORCING AN EMERGENCY LDG. 77 BIRDS WERE FOUND DEAD ON RWY/TWY
## 5
## 6
##   Wildlife..Size Conditions..Sky     Wildlife..Species
## 1         Medium        No Cloud Unknown bird - medium
## 2          Small      Some Cloud           Rock pigeon
## 3          Small        No Cloud     European starling
## 4          Small      Some Cloud     European starling
## 5          Small        No Cloud     European starling
## 6          Small        No Cloud  Unknown bird - small
##   Pilot.warned.of.birds.or.wildlife. Cost..Total.. Feet.above.ground
## 1                                  N        30,736             1,500
## 2                                  Y             0                 0
## 3                                  N             0                50
## 4                                  Y             0                50
## 5                                  N             0                50
## 6                                  N             0                 0
##   Number.of.people.injured Is.Aircraft.Large.
## 1                        0               Yes
## 2                        0                No
## 3                        0                No
```

```
## 4                        0               Yes
## 5                        0                No
## 6                        0                No
```

##Remove non-essential data

```
mydata$Wildlife..Number.struck = NULL
mydata$Wildlife..Number.Struck.Actual = NULL
mydata$Remains.of.wildlife.collected. = NULL
mydata$Remains.of.wildlife.sent.to.Smithsonian = NULL
mydata$Altitude.bin = NULL
mydata$Is.Aircraft.Large. = NULL
```

##Creating Airport Table

```
library("dplyr")
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
head(mydata) %>% select(Airport..Name, Origin.State)
```

```
##                 Airport..Name Origin.State
## 1                LAGUARDIA NY     New York
## 2 DALLAS/FORT WORTH INTL ARPT        Texas
## 3           LAKEFRONT AIRPORT    Louisiana
## 4         SEATTLE-TACOMA INTL   Washington
## 5                NORFOLK INTL     Virginia
## 6         GUAYAQUIL/S BOLIVAR          N/A
```

```
mydata1 <- mydata %>% select(Airport..Name, Origin.State)
names(mydata1)[names(mydata1) == "Airport..Name"] <- "Airport_Name"
names(mydata1)[names(mydata1) == "Origin.State"] <- "Origin"
```

```
dbWriteTable(mydb, "airport", mydata1, append = TRUE, row.names = FALSE)
```

```
## [1] TRUE
```

##Creating Aircraft Table

```
library("dplyr")
mydata2 <- mydata %>% select(Aircraft..Make.Model, Aircraft..Number.of.engines.)
names(mydata2)[names(mydata2) == "Aircraft..Make.Model"] <- "Model"
names(mydata2)[names(mydata2) == "Aircraft..Number.of.engines."] <- "Engines"
head(mydata2)
```

```
##          Model Engines
## 1    B-737-400       2
## 2        MD-80       2
## 3        C-500       2
## 4    B-737-400       2
## 5 CL-RJ100/200       2
## 6        A-300       2
```

if local data loading is disabled, use

mysql> show global variables like 'local_infile';

mysql> set global local_infile=true;

```
dbWriteTable(mydb, "aircraft", mydata2, append = TRUE, row.names = FALSE)
```

mysql> exit

```
## [1] TRUE
```

Creating Bird Table

```
library("dplyr")
mydata3 <- mydata %>% select(Wildlife..Species, Wildlife..Size)
names(mydata3)[names(mydata3) == "Wildlife..Species"] <- "Species"
names(mydata3)[names(mydata3) == "Wildlife..Size"] <- "Size"
head(mydata3)
```

```
##                 Species   Size
## 1 Unknown bird - medium Medium
## 2           Rock pigeon  Small
## 3     European starling  Small
## 4     European starling  Small
## 5     European starling  Small
## 6  Unknown bird - small  Small
```

```
dbWriteTable(mydb, "birds", mydata3, append = TRUE, row.names = FALSE)
```

```
## [1] TRUE
```

Remove Non Essential Columns

```
head(mydata)
```

```
##   ï..Record.ID Aircraft..Type               Airport..Name Aircraft..Make.Model
## 1       202152       Airplane                LAGUARDIA NY            B-737-400
## 2       208159       Airplane DALLAS/FORT WORTH INTL ARPT                MD-80
## 3       207601       Airplane           LAKEFRONT AIRPORT                C-500
## 4       215953       Airplane         SEATTLE-TACOMA INTL            B-737-400
## 5       219878       Airplane                NORFOLK INTL         CL-RJ100/200
## 6       218432       Airplane          GUAYAQUIL/S BOLIVAR                A-300
##   Effect..Impact.to.flight      FlightDate Effect..Indicated.Damage
## 1         Engine Shut Down 11/23/2000 0:00            Caused damage
## 2                     None  7/25/2001 0:00            Caused damage
## 3                     None  9/14/2001 0:00                No damage
## 4    Precautionary Landing   9/5/2002 0:00                No damage
## 5                     None  6/23/2003 0:00                No damage
## 6                     None  7/24/2003 0:00                No damage
##   Aircraft..Number.of.engines. Aircraft..Airline.Operator Origin.State
## 1                            2                US AIRWAYS*     New York
## 2                            2           AMERICAN AIRLINES        Texas
## 3                            2                    BUSINESS    Louisiana
## 4                            2             ALASKA AIRLINES   Washington
## 5                            2             COMAIR AIRLINES     Virginia
## 6                            2           AMERICAN AIRLINES          N/A
##   When..Phase.of.flight Conditions..Precipitation
## 1                Climb                      None
## 2         Landing Roll                      None
## 3             Approach                      None
## 4                Climb                      None
## 5             Approach                      None
## 6          Take-off run                      None
##
## 1  FLT 753. PILOT REPTD A HUNDRED BIRDS ON UNKN TYPE. #1 ENG WAS SHUT DOWN AND DIVERTED TO EWR. SLIG
## 2
## 3
## 4 NOTAM WARNING. 26 BIRDS HIT THE A/C, FORCING AN EMERGENCY LDG. 77 BIRDS WERE FOUND DEAD ON RWY/TWY
## 5
## 6
##   Wildlife..Size Conditions..Sky     Wildlife..Species
## 1         Medium        No Cloud Unknown bird - medium
## 2          Small      Some Cloud           Rock pigeon
## 3          Small        No Cloud     European starling
## 4          Small      Some Cloud     European starling
## 5          Small        No Cloud     European starling
## 6          Small        No Cloud  Unknown bird - small
##   Pilot.warned.of.birds.or.wildlife. Cost..Total.. Feet.above.ground
## 1                                  N        30,736             1,500
## 2                                  Y             0                 0
## 3                                  N             0                50
## 4                                  Y             0                50
## 5                                  N             0                50
## 6                                  N             0                 0
```

```
##   Number.of.people.injured
## 1                        0
## 2                        0
## 3                        0
## 4                        0
## 5                        0
## 6                        0
```

```
mydata$Wildlife..Size = NULL
mydata$Is.Aircraft.Large. = NULL
mydata$Aircraft..Number.of.engines. = NULL
mydata$Aircraft..Type = NULL
head(mydata)
```

```
##   ï..Record.ID               Airport..Name Aircraft..Make.Model
## 1       202152                LAGUARDIA NY             B-737-400
## 2       208159 DALLAS/FORT WORTH INTL ARPT                 MD-80
## 3       207601           LAKEFRONT AIRPORT                 C-500
## 4       215953         SEATTLE-TACOMA INTL             B-737-400
## 5       219878                NORFOLK INTL          CL-RJ100/200
## 6       218432         GUAYAQUIL/S BOLIVAR                 A-300
##   Effect..Impact.to.flight      FlightDate Effect..Indicated.Damage
## 1         Engine Shut Down 11/23/2000 0:00            Caused damage
## 2                     None  7/25/2001 0:00            Caused damage
## 3                     None  9/14/2001 0:00                No damage
## 4    Precautionary Landing   9/5/2002 0:00                No damage
## 5                     None  6/23/2003 0:00                No damage
## 6                     None  7/24/2003 0:00                No damage
##   Aircraft..Airline.Operator Origin.State When..Phase.of.flight
## 1                US AIRWAYS*     New York                 Climb
## 2          AMERICAN AIRLINES        Texas          Landing Roll
## 3                   BUSINESS    Louisiana              Approach
## 4            ALASKA AIRLINES   Washington                 Climb
## 5            COMAIR AIRLINES     Virginia              Approach
## 6          AMERICAN AIRLINES          N/A          Take-off run
##   Conditions..Precipitation
## 1                      None
## 2                      None
## 3                      None
## 4                      None
## 5                      None
## 6                      None
##
## 1  FLT 753. PILOT REPTD A HUNDRED BIRDS ON UNKN TYPE. #1 ENG WAS SHUT DOWN AND DIVERTED TO EWR. SLIG
## 2
## 3
## 4 NOTAM WARNING. 26 BIRDS HIT THE A/C, FORCING AN EMERGENCY LDG. 77 BIRDS WERE FOUND DEAD ON RWY/TWY
## 5
## 6
##   Conditions..Sky     Wildlife..Species Pilot.warned.of.birds.or.wildlife.
## 1        No Cloud Unknown bird - medium                                 N
## 2      Some Cloud           Rock pigeon                                 Y
## 3        No Cloud     European starling                                 N
## 4      Some Cloud     European starling                                 Y
```

```
## 5        No Cloud     European starling                                  N
## 6        No Cloud  Unknown bird - small                                  N
##   Cost..Total.. Feet.above.ground Number.of.people.injured
## 1        30,736             1,500                        0
## 2             0                 0                        0
## 3             0                50                        0
## 4             0                50                        0
## 5             0                50                        0
## 6             0                 0                        0
```

Fill in Record table and rename columns to be same as SQL table

```
library("dplyr")
names(mydata)[names(mydata) == "ï..Record.ID"] <- "Record_ID"
names(mydata)[names(mydata) == "Airport..Name"] <- "Airport_Name"
names(mydata)[names(mydata) == "Aircraft..Make.Model"] <- "Aircraft_Name"
names(mydata)[names(mydata) == "Effect..Impact.to.flight"] <- "Flight_Impact"
names(mydata)[names(mydata) == "FlightDate"] <- "Flight_Date"
names(mydata)[names(mydata) == "Effect..Indicated.Damage"] <- "Indicated_Damage"
names(mydata)[names(mydata) == "Aircraft..Airline.Operator"] <- "Airline"
names(mydata)[names(mydata) == "Origin.State"] <- "Origin"
names(mydata)[names(mydata) == "When..Phase.of.flight"] <- "Phase"
names(mydata)[names(mydata) == "Conditions..Sky"] <- "Sky"
names(mydata)[names(mydata) == "Wildlife..Species"] <- "Species"
names(mydata)[names(mydata) == "Pilot.warned.of.birds.or.wildlife."] <- "Pilot_Warned"
names(mydata)[names(mydata) == "Cost..Total.."] <- "Cost"
names(mydata)[names(mydata) == "Feet.above.ground"] <- "Altitude"
names(mydata)[names(mydata) == "Number.of.people.injured"] <- "Number_Injured"
names(mydata)[names(mydata) == "Conditions..Precipitation"] <- "Precipitation"
```

Reformat Date in R dataframe to be read into SQL

```
library("tidyr")
mydata <- separate(mydata, Flight_Date, into = c("Date", "Time"), sep = " ")
```

```
## Warning: Expected 2 pieces. Missing pieces filled with `NA` in 129 rows [130,
## 2015, 3934, 4158, 4874, 5748, 5751, 6049, 6121, 6255, 6587, 6622, 6693, 7055,
## 7139, 7147, 7329, 7699, 8029, 8081, ...].
```

```
mydata$Time = NULL
mydata$newdate <- strptime(as.character(mydata$Date), "%m/%d/%Y")
mydata$newdate <- format(mydata$newdate, "%Y-%m-%d")
names(mydata)[names(mydata) == "newdate"] <- "Flight_Date"
mydata$Date = NULL
mydata$Flight_Date <- as.Date(mydata$Flight_Date)
head(mydata)
```

```
##   Record_ID               Airport_Name Aircraft_Name         Flight_Impact
## 1    202152               LAGUARDIA NY     B-737-400      Engine Shut Down
```

```
## 2    208159 DALLAS/FORT WORTH INTL ARPT         MD-80                  None
## 3    207601           LAKEFRONT AIRPORT         C-500                  None
## 4    215953         SEATTLE-TACOMA INTL     B-737-400 Precautionary Landing
## 5    219878                NORFOLK INTL  CL-RJ100/200                  None
## 6    218432         GUAYAQUIL/S BOLIVAR         A-300                  None
##   Indicated_Damage           Airline     Origin        Phase Precipitation
## 1    Caused damage       US AIRWAYS*   New York        Climb          None
## 2    Caused damage AMERICAN AIRLINES      Texas Landing Roll          None
## 3        No damage          BUSINESS  Louisiana     Approach          None
## 4        No damage   ALASKA AIRLINES Washington        Climb          None
## 5        No damage   COMAIR AIRLINES   Virginia     Approach          None
## 6        No damage AMERICAN AIRLINES        N/A Take-off run          None
##
## 1  FLT 753. PILOT REPTD A HUNDRED BIRDS ON UNKN TYPE. #1 ENG WAS SHUT DOWN AND DIVERTED TO EWR. SLIG
## 2
## 3
## 4 NOTAM WARNING. 26 BIRDS HIT THE A/C, FORCING AN EMERGENCY LDG. 77 BIRDS WERE FOUND DEAD ON RWY/TWY
## 5
## 6
##          Sky               Species Pilot_Warned   Cost Altitude Number_Injured
## 1   No Cloud Unknown bird - medium            N 30,736    1,500              0
## 2 Some Cloud           Rock pigeon            Y      0        0              0
## 3   No Cloud     European starling            N      0       50              0
## 4 Some Cloud     European starling            Y      0       50              0
## 5   No Cloud     European starling            N      0       50              0
## 6   No Cloud  Unknown bird - small            N      0        0              0
##   Flight_Date
## 1  2000-11-23
## 2  2001-07-25
## 3  2001-09-14
## 4  2002-09-05
## 5  2003-06-23
## 6  2003-07-24
```

```
dbWriteTable(mydb, "record", mydata, append = TRUE, row.names = FALSE)
```

```
## [1] TRUE
```

Fill in record table with foreign keys for Airport

```
UPDATE record, airport
SET
record.Airport_ID = airport.Airport_ID
WHERE record.airport_Name = airport.airport_name AND record.Origin = airport.Origin
```

Fill in record table with foreign keys for Aircraft

```
UPDATE record, aircraft
SET
```

```
record.Aircraft_ID = aircraft.Aircraft_ID
WHERE record.aircraft_Name = aircraft.Model
```

Fill in record table with foreign keys for Birds

```
UPDATE record, birds
SET
record.Bird_ID = birds.bird_ID
WHERE record.species = birds.species
```

Drop columns for record after filling foreign keys

```
ALTER TABLE record
DROP COLUMN species;
```

```
ALTER TABLE record
DROP COLUMN Aircraft_Name;
```

```
ALTER TABLE record
DROP COLUMN Airport_Name;
```

```
ALTER TABLE record
DROP COLUMN Origin;
```

Q4)

```
SELECT
    record.airline AS Airline, COUNT(DISTINCT Record.record_id) as BirdStrikes
FROM
    Record
WHERE
    Record.phase = 'Take-off run'
        OR Record.Phase = 'Climb'
GROUP BY Record.airline
```

Table 1: Displaying records 1 - 10

Airline	BirdStrikes
ABX AIR	51
ACM AVIATION	1
ADI SHUTTLE GROUP	5
AER LINGUS	2
AEROMEXICO	1
AIR AMERICA/TOTAL AIR	1
AIR BC	2

Airline	BirdStrikes
AIR CANADA	34
AIR CANADA JAZZ	20
AIR CARGO CARRIERS	3

Q5)

```
SELECT
    airport.Airport_Name AS Airport_Name, COUNT(Record.record_id) AS BirdStrikes
FROM
    Record, Airport
    WHERE Record.Airport_ID = airport.Airport_ID
GROUP BY Airport.airport_Name
ORDER BY BirdStrikes DESC;
```

Table 2: Displaying records 1 - 10

Airport_Name	BirdStrikes
DALLAS/FORT WORTH INTL ARPT	803
SACRAMENTO INTL	676
SALT LAKE CITY INTL	479
DENVER INTL AIRPORT	476
KANSAS CITY INTL	452
PHILADELPHIA INTL	442
ORLANDO INTL	408
BALTIMORE WASH INTL	401
LOUISVILLE INTL ARPT	395
JOHN F KENNEDY INTL	390

Q6)

```
query6 <- dbGetQuery(mydb, "SELECT EXTRACT(YEAR FROM Record.flight_date) as Year,
                    COUNT(DISTINCT Record.record_id) AS BirdStrikes FROM Record GROUP BY
                    EXTRACT(YEAR FROM Record.flight_date);")
head(query6);
```

```
##   Year BirdStrikes
## 1   NA         129
## 2 2000        1367
## 3 2001        1230
## 4 2002        1681
## 5 2003        1568
## 6 2004        1692
```

Q7) Create View For ascent/Take-off Run

```
DROP VIEW IF EXISTS ViewAsc
```

```
CREATE View ViewAsc AS
SELECT
    EXTRACT(YEAR FROM Record.flight_date) AS YEAR,
    Record.Phase,
    COUNT(DISTINCT Record.record_id) AS BirdStrikes
FROM
    Record
WHERE EXTRACT(YEAR FROM Record.flight_date) >= 2008
GROUP BY EXTRACT(YEAR FROM Record.flight_date) , Record.Phase
HAVING Record.phase = 'Take-off run'
    OR Record.phase = 'Climb'
```

```
DROP VIEW IF EXISTS ViewDesc
```

Create view for Descent/Landing Roll

```
CREATE View ViewDesc AS
SELECT
    EXTRACT(YEAR FROM Record.flight_date) AS YEAR,
    Record.Phase,
    COUNT(DISTINCT Record.record_id) AS BirdStrikes
FROM
    Record
WHERE EXTRACT(YEAR FROM Record.flight_date) >= 2008
GROUP BY EXTRACT(YEAR FROM Record.flight_date) , Record.Phase
HAVING Record.phase = 'Landing Roll'
    OR Record.phase = 'Descent'
```

Import Ascent/Take-off data into data frame

```
chart1 <- dbGetQuery(mydb, "Select Year, sum(BirdStrikes) as BirdStrikes from viewAsc Group By Year");
```

```
## Warning in .local(conn, statement, ...): Decimal MySQL column 1 imported as
## numeric
```

```
chart1["Phase"] = "Ascent + TakeOff"
chart1
```

```
##   Year BirdStrikes            Phase
## 1 2008         810 Ascent + TakeOff
## 2 2009        1127 Ascent + TakeOff
## 3 2010        1062 Ascent + TakeOff
## 4 2011        1030 Ascent + TakeOff
```

Import Descent/Landing data into data frame

```
chart2 <- dbGetQuery(mydb, "Select Year, sum(BirdStrikes) as BirdStrikes from viewDesc Group By Year");
```

```
## Warning in .local(conn, statement, ...): Decimal MySQL column 1 imported as
## numeric
```

```
chart2["Phase"] = "Descent + Landing"
chart2
```

```
##   Year BirdStrikes             Phase
## 1 2008         562 Descent + Landing
## 2 2009         791 Descent + Landing
## 3 2010         762 Descent + Landing
## 4 2011         636 Descent + Landing
```

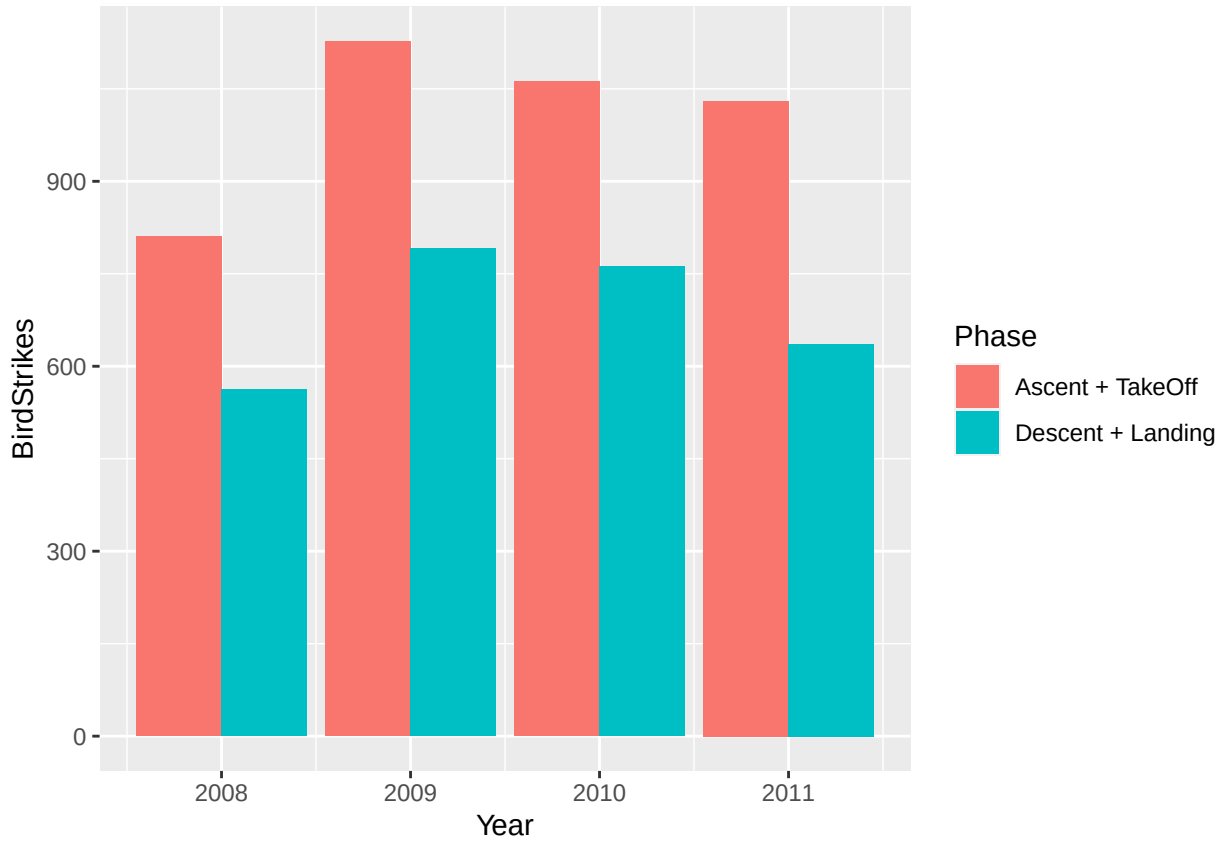
Merge the two

```
chart3 <- rbind(chart1, chart2)
chart3
```

```
##   Year BirdStrikes             Phase
## 1 2008         810  Ascent + TakeOff
## 2 2009        1127  Ascent + TakeOff
## 3 2010        1062  Ascent + TakeOff
## 4 2011        1030  Ascent + TakeOff
## 5 2008         562 Descent + Landing
## 6 2009         791 Descent + Landing
## 7 2010         762 Descent + Landing
## 8 2011         636 Descent + Landing
```

Create Graph

```
library("ggplot2")
ggplot(data = chart3, mapping = aes(x = Year, y = BirdStrikes, fill = Phase)) +
  geom_bar(stat = "identity", position = "dodge")
```



Q8)

```
DROP Procedure IF EXISTS deleteRecord
```

```
CREATE DEFINER=`root`@`localhost` PROCEDURE `deleteRecord`(IN recordID INTEGER)
BEGIN
Delete from record
where record.record_id = recordID;
END
```

```
Select * from record where Record_ID = 205958
```

Might show up as 0 rows since it has already been deleted. Re-read data into SQL or enter new Record_ID

Table 3: 1 records

Record_ID	Airport_ID	Aircraft_ID	Flight_Date	Airline	Indicated_Damage	Flight_Phase	Remarks	Altitude	Cost	Pilot_Warned	Sky	Precipitation	Bird_Num	Number_Injured
205958	52	10	2000-01-20	AMERICAN AIR-LINES	Caused damage	None	Approach	JUST OUTSIDE OF WILLT ON VISUAL APCH, WE FLEW THRU A FLOCK OF GEESE. WE HIT AT LEAST 1, HEARD THE SOUND. RT WING SUFFERED SIGNIFICANTLY MORE DMG THAN L WING. (L. SCHAFER, WS DID NOT KNOW ABOUT THIS STRIKE). ALSO SAW EVIDENCE OF STRIKE AROUND THE R ENG	1	0	N	No Cloud	None	5	0

```
Call deleteRecord(205958);
```

```
Select * from record where Record_ID = 205958
```

Table 4: 0 records

Record_ID	Airport_ID	Aircraft_ID	Flight_Date	Airline	Indicated_Damage	Flight_Phase	Remarks	Altitude	Cost	Pilot_Warned	Sky	Precipitation	Bird_Num	Number_Injured

Disconnect from Database

Disconnect from the database (important as database servers have limited numbers of connection and each connection uses a resource).

```
dbDisconnect(mydb)
```

```
## [1] TRUE
```