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title: "Project / Design & Implement a Relational Database"
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output: html_notebook
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```

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/* "Below is the breakdown the tasks:
• The first installing package (RMySQL) in the library library
• Then, setting AWS-database
• Dropped the tables
• Created table and constraints:
  o Created table Incidents,
  o Created table airports,
  o Altered table incidents adding constrain Foreign Key origin references to
airport(aid)
  o Created table conditions
  o Altered table incidents adding constrain foreign key incidents condition
FK references condition (cid)
  o Altered table incidents add constrain flight phases in such: takeoff,
landing, inflight, unknown
• load data from CSV file:
  o Change the colname of one column
  o insert to conditions table
  o insert to airports
  o retrieve from airports
  o insert into incidents
  o Do not select MILITARY: choose the foreign key for airport, choose the
foreign key for sky_conditions
  o rename columns
  o incidents insert to incidents table
• Query selecting airlines, count from incident grouping descent and limiting
to 10 airlines.
• Query selecting flight phase counting & selecting from incident grouping by
flight phase, and calculating the average number of bird strike incidents
during any flight phase.
• Query selecting months (date) , count from incidents group by month.
• Query buildings a line char visual, scatter plot (select count bird
strikes, year between 2005–2011. X-axis = year, and Y-axis birdstrikes
incidents
• Created a store procedure in MySQL, calling insert incidents, and finally
sql chunk selecting from incidents where rid = '200099'
• Lastly, disconnect or close the database.
```

Challenges:

The directions were very helpful, but I experienced some challenges with the database setup and running. I created db4free twice both times failed upon loading (sign: loading local data is disabled; thus must be enabled on both the client and server sides). Then, I create Amazon AWS. Afterward, our program was able to connect and run without any issues."*/

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```{r}
1. Library
library(RMySQL)

2. Settings

AWS
db_user <- 'admin'
db_password <- '#####'
db_name <- 'cs_Database_Project1'
db_host <- 'mysqlworks.amazonaws.com'
db_port <- 2211

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

#-Drop Table-

```{sql connection=mydb}
DROP TABLE IF EXISTS incidents
```

```{sql connection=mydb}
DROP TABLE IF EXISTS airports
```

```{sql connection=mydb}
DROP TABLE IF EXISTS conditions
```

```{sql connection=mydb}
DROP PROCEDURE IF EXISTS InsertIncidents
```

#create table and constrains
```{sql connection=mydb}
CREATE TABLE incidents(
 rid INT PRIMARY KEY,
 date DATE,
 origin INT,
 airline VARCHAR(50) DEFAULT 'unknown',
 aircraft VARCHAR(50),
 flightPhase VARCHAR(50),
 altitude VARCHAR(50),

```

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 conditions INT,
 warning BOOLEAN
)
 ...

```{sql connection=mydb}
CREATE TABLE airports(
    aid int PRIMARY KEY AUTO_INCREMENT,
    airportName VARCHAR (150) unique DEFAULT 'unknown',
    airportCode VARCHAR(50),
    state VARCHAR(50)
)
...

```{sql connection=mydb}
ALTER TABLE incidents
add constraint fk_incidents_origin
FOREIGN KEY (origin) REFERENCES airports(aid);
...

```{sql connection=mydb}
CREATE TABLE conditions(

    cid INT PRIMARY KEY AUTO_INCREMENT,
    conditions VARCHAR (100),
    explanation VARCHAR(256)
)
...

```{sql connection=mydb}
ALTER TABLE incidents
ADD constraint fk_incidents_conditions
FOREIGN KEY (conditions) REFERENCES conditions(cid);
...

```{sql connection=mydb}
ALTER TABLE incidents
ADD constraint chk_incidents_phase
check(flightPhase IN ('takeoff',
    'landing', 'inflight', 'unknown'));

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#load data from csv file

```{r}
birdStrikesData <- read.csv(file="BirdStrikesData-V2.csv", header=TRUE,
sep=",")
sky_conditions <- unique(birdStrikesData['sky_conditions'])
```

Change colname of one column
```{r}
colnames(sky_conditions)[colnames(sky_conditions) == "sky_conditions"] <-
"conditions"
```

insert to conditions table
```{r}
dbWriteTable(mydb, "conditions", sky_conditions, override=FALSE, append=TRUE,
row.names=FALSE)
```

insert to airports
```{r}
airports <- unique(birdStrikesData[c('airport', 'origin')])
colnames(airports)[colnames(airports) == "airport"] <- "airportName"
colnames(airports)[colnames(airports) == "origin"] <- "state"
dbWriteTable(mydb, "airports", airports, override=FALSE, append=TRUE,
row.names=FALSE)
```

#retrieve from airports
```{r}
rs <- dbSendQuery(mydb, "SELECT aid, airportName FROM airports")
aid_aiport_names <- fetch(rs, n = -1)
```

```{r}
rs <- dbSendQuery(mydb, "SELECT cid, conditions FROM conditions;")
cid_conditions <- fetch(rs, n = -1)
```

#insert into incidents
```{r}
incidents = birdStrikesData[c('rid', 'flight_date', 'airport', 'aircraft',
'airline', 'flight_phase', 'altitude_ft', 'sky_conditions',
'pilot_warned_flag')]
```

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Do not select MILITARY
```{r}
incidents = incidents[incidents$airline != 'MILITARY',]
for(i in 1:nrow(incidents)) {

  #choose the foreign key for airport
  airport_name <- incidents$airport[i]
  row = aid_aiport_names[(aid_aiport_names$airportName == airport_name),]
  if(length(row) > 0){
    incidents$airport[i] = row['aid'][,1]
  } else{
    incidents$airport[i] =NA
  }

  #choose the foreign key for sky_conditions
  sky_conditions <- incidents$sky_conditions[i]
  row = cid_conditions[(cid_conditions$conditions == sky_conditions),]
  incidents$sky_conditions[i] = row['cid'][,1]

  flight_phase = incidents$flight_phase[i]
  if (flight_phase == "Climb"){
    incidents$flight_phase[i] = "takeoff"
  }else if (flight_phase == "Landing Roll"){
    incidents$flight_phase[i] = "landing"
  }else if (flight_phase == "Approach"){
    incidents$flight_phase[i] = "landing"
  }else if (flight_phase == "Take-off run"){
    incidents$flight_phase[i] = "takeoff"
  }else if (flight_phase == "Descent"){
    incidents$flight_phase[i] = "landing"
  }else{
    incidents$flight_phase[i] = "unknown"
  }

  pilot_warned_flag = incidents$pilot_warned_flag[i]
  if (pilot_warned_flag == "N"){
    incidents$pilot_warned_flag[i] = "0"
  }else{
    incidents$pilot_warned_flag[i] = "1"
  }

  incidents$flight_date[i] = as.character(as.Date(incidents$flight_date[i],
"%m/%d/%Y %H:%M"))
}
```

#rename columns

```{r}
colnames(incidents)[colnames(incidents) == "flight_date"] <- "date"
colnames(incidents)[colnames(incidents) == "airport"] <- "origin"
colnames(incidents)[colnames(incidents) == "flight_phase"] <- "flightPhase"
colnames(incidents)[colnames(incidents) == "altitude_ft"] <- "altitude"
colnames(incidents)[colnames(incidents) == "sky_conditions"] <- "conditions"
colnames(incidents)[colnames(incidents) == "pilot_warned_flag"] <- "warning"

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```
#incidents
insert to incidents table
```{r}
```

```
dbWriteTable(mydb, "incidents", incidents, override=TRUE, append=TRUE,
row.names=FALSE)
```

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4. Create a SQL query against your database to find the 10 airlines with the greatest number of incidents

```
```{sql connection=mydb}
select airline, count(*) as count from incidents group by airline order by
count DESC limit 10;
```
```

5. Create a SQL query against your database to find the flight phase that had an above average number bird strike incidents (during any flight phase).

```
```{sql connection=mydb}
select A.flightPhase from (SELECT flightPhase, COUNT(*) AS flightPhaseCount
FROM incidents
GROUP BY flightPhase) as A, (SELECT AVG(C.flightPhaseCount) as aver
from(SELECT COUNT(*) AS flightPhaseCount FROM incidents
GROUP BY flightPhase) as C) as B where flightPhaseCount > B.aver;
```
```

6. Create a SQL query against your database to find the number of bird strike incidents by month (across all years). Include all airlines and all flights

```
```{sql connection=mydb}

SELECT month (date), count(*) FROM incidents
GROUP BY month(date);
```
```

7. Build a line chart that visualizes the number of bird strikes incidents per year from 2005 to 2011. Adorn the graph with appropriate axis labels, titles, legend, data labels, etc.

```
```{r}
rs <- dbGetQuery(mydb, "select count(*) as 'bird_strikes_incidents',
year(date) as year FROM incidents
where year(date) between 2005 and 2011
group by year(date);")

plot(x=rs$year, y=rs$bird_strikes_incidents,xlab="year", ylab="bird strikes
incidents",main="bird strikes incidents per year from 2005 to 2011")
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## 8. Create a stored procedure in MySQL

```
```{sql connection=mydb}
CREATE PROCEDURE InsertIncidents(
    IN rid int,
    IN date date,
    IN origin int,
    IN airline varchar(50),
    IN aircraft varchar(50),
    IN flightPhase varchar(50),
    IN altitude varchar(50),
    IN conditions int,
    IN warning boolean
)
BEGIN
    INSERT INTO incidents
    (rid,
    date,
    origin,
    airline,
    aircraft,
    flightPhase,
    altitude,
    conditions,
    warning)
VALUES
    (rid,
    date,
    origin,
    airline,
    aircraft,
    flightPhase,
    altitude,
    conditions,
    warning);
END
```

```{sql connection=mydb}
CALL InsertIncidents('200099', '2001-04-06', '48', 'ABX AIR', 'Airplane',
'landing', '0', '3', '1');
```

```{sql connection=mydb}
select * FROM incidents where rid = '200099';
```

#close database
```

```
```{r}  
dbDisconnect(mydb)  
```
```