CS 425 – Database Organization

Fall 2023

Homework 1.1

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Due Date: 9/3/23

Contributions:
Both members completed all questions together, compared/discussed answers, and then took 1 file as a submission.

Notes:

For this assignment, Microsoft SQL Server was used but for future assignments, MySQL Workbench will be used. Permission was granted from the professor for this assignment.

Database Schema Implementation:

```
Create Database sailing_club
USE sailing_club

--Create Schema Sailors
Create table Sailors (
Sname Varchar(225),
SID Int Primary Key,
Rating int,
Age int
);

--Create Schema Boats
Create table Boats (
Bname Varchar(225),
BID Int Primary Key,
Fee int,
Location Varchar(225)
);

--Create Schema Captains
Create table Captains (
Sname Varchar(225),
SID Int,
Rating int,
Age int,
Constraint FK_Captains_SID foreign Key (SID) References Sailors (SID)
);

--Create Schema Reserves
Create table Reserves (
SID Int,
BID Int,
"Day" Date,
Deposit int,
Primary Key(SID,BID),
Constraint FK_Reserves_SID foreign key (SID) references Sailors (SID),
Constraint FK_Reserves_BID foreign key (BID) references Boats(BID)
);

--Inserting records into Sailors
Insert Into Sailors (Sname,SID,Rating,Age) values
('Marxs', 23,8, 52),
('Martin', 25,9,51),
('Adams',27,8,36),
('Carrey',33,10,22);

--Inserting records into Boats
Insert Into Boats (Bname,BID,fee,Location) values
('Wayfarer', 109,120, 'Hout Bay'),
('SeaPride', 108,500,'Fish Hoek'),
('Yuppie',101,400,'Hout Bay'),
('Joy',104,200,'Hout Bay');
```

```sql
--Inserting records into Reserves
Insert Into Reserves (SID,BID,Day,Deposit) values
(23, 109, '2014-08-01', 120),
(23, 108, '2014-08-08', 120),
(25, 101, '2014-08-08', 0),
(27, 101, '2014-08-09', 100),
(27, 109, '2014-08-15', 120),
(33, 109, '2014-09-04', 0),
(33, 104, '2014-09-11',0);

select * from Sailors
select * from boats
select * from  reserves
select * from captains
```

Results Messages

	Sname	SID	Rating	Age
1	Marxs	23	8	52
2	Martin	25	9	51
3	Adams	27	8	36
4	Carrey	33	10	22

	Bname	BID	Fee	Location
1	Yuppie	101	400	Hout Bay
2	Joy	104	200	Hout Bay
3	SeaPride	108	500	Fish Hoek
4	Wayfarer	109	120	Hout Bay

	SID	BID	Day	Deposit
1	23	108	2014-08-08	120
2	23	109	2014-08-01	120
3	25	101	2014-08-08	0
4	27	101	2014-08-09	100
5	27	109	2014-08-15	120
6	33	104	2014-09-11	0
7	33	109	2014-09-04	0

	Sname	SID	Rating	Age

Qn 1.

1.

Get everything in the Sailors table.

```
select * from Sailors
```

Results Messages

	Sname	SID	Rating	Age
1	Marxs	23	8	52
2	Martin	25	9	51
3	Adams	27	8	36
4	Carrey	33	10	22

2.

Get sailor ID, rank & age of all sailors, ordered from highest to lowest rank. Rank is 10 times rating.

```
select SID, Rating*10, Age from Sailors Order By Rating desc
```

```
select SID, Rating*10, Age from Sailors
Order By Rating desc
```

100 %

Results Messages

	SID	(No column name)	Age
1	33	100	22
2	25	90	51
3	27	80	36
4	23	80	52

3.

Get alphabetical list of sailors with rating less than 10.

```
Select sname from Sailors where Rating<=9 order by sname
```

```
select sname
from Sailors
where Rating<=9
order by sname
```

100 %

Results Messages

	sname
1	Adams
2	Martin
3	Marxs

4.

Find how much deposit money there is in total and how many tuples are in the reserves table.

```
select sum(deposit) as TOTAL, count(deposit) as HOWMANY from reserves
```

	TOTAL	HOWMANY
1	460	7

5.

Get all info on boats in Fishhoek but I'm not sure how you spell Fishoek.

```
Select * from Boats where Location like '_is%k'
```

```
Select * from Boats
where Location like '_is%k'
```

00 %

Results Messages

	Bname	BID	Fee	Location
1	SeaPride	108	500	Fish Hoek

6.

In what locations are boats kept?

```
select distinct(location) from boats
```

	location
1	Fish Hoek
2	Hout Bay

7.

Get the names of all Boats that have a fee value recorded in the database.

```
select bname from boats where fee is not null
```

	bname
1	Yuppie
2	Joy
3	SeaPride
4	Wayfarer

8.

Get ID of all boats that have not been reserved.

```
select BID from boats
except (select BID from reserves)
```

BID

9.

Get all reservation info, including all details on the boats being reserved.

```
select * from reserves, boats
where reserves.BID=boats.BID
```

	SID	BID	Day	Deposit	Bname	BID	Fee	Location
1	23	108	2014-08-08	120	SeaPride	108	500	Fish Hoek
2	23	109	2014-08-01	120	Wayfarer	109	120	Hout Bay
3	25	101	2014-08-08	0	Yuppie	101	400	Hout Bay
4	27	101	2014-08-09	100	Yuppie	101	400	Hout Bay
5	27	109	2014-08-15	120	Wayfarer	109	120	Hout Bay
6	33	104	2014-09-11	0	Joy	104	200	Hout Bay
7	33	109	2014-09-04	0	Wayfarer	109	120	Hout Bay

10.

For all reservations, get the name of the sailor, along with the day and name of the boat booked.

```
select sname,day,bname
from sailors as S, reserves as R, boats as B
where S.SID= R.SID and R.BID =B.BID
```

	sname	day	bname
1	Marxs	2014-08-08	SeaPride
2	Marxs	2014-08-01	Wayfarer
3	Martin	2014-08-08	Yuppie
4	Adams	2014-08-09	Yuppie
5	Adams	2014-08-15	Wayfarer
6	Carrey	2014-09-11	Joy
7	Carrey	2014-09-04	Wayfarer

11.

Get the average deposit paid for each boat.

```
SELECT BID, AVG(DEPOSIT) FROM RESERVES
GROUP BY BID
```

	BID	(No column name)
1	101	50
2	104	0
3	108	120
4	109	80

12.

Get the average deposit paid for each boat that has been booked by more than one person.

```
SELECT BID, AVG(DEPOSIT)FROM RESERVES
GROUP BY BID
HAVING COUNT (DISTINCT SID) > 1
```

	BID	(No column name)
1	101	50
2	109	80

13.

Get the average firm deposit paid for each boat that has been booked by more than one person, in increasing order of amount. A firm deposit is one which exceeds R10.

```
SELECT BID, AVG(DEPOSIT) AS AMOUNTDEPOSIT
FROM RESERVES
WHERE DEPOSIT >10
GROUP BY BID
HAVING COUNT (DISTINCT SID)>1
ORDER BY AMOUNTDEPOSIT
```

BID	AMOUNTDEPOSIT
109	120

14.

Get name & rating of sailors with rating exceeding 7 who made any reservation with 0 deposit.

```
SELECT SNAME, RATING FROM SAILORS
WHERE RATING > 7 AND SID IN (
SELECT SID FROM RESERVES WHERE DEPOSIT =0)
```

	SNAME	RATING
1	Martin	9
2	Carrey	10

15.

Get name of boats located in a place other than Hout Bay or Fish Hoek.

```
SELECT BNAME FROM BOATS WHERE LOCATION NOT IN ('HOUT BAY', 'FISH HOEK')
```

BNAME

16.

Get names of boats having a fee larger than any boat located in Hout Bay.

```
SELECT DISTINCT BNAME FROM BOATS
WHERE FEE> some
(SELECT FEE FROM BOATS
WHERE LOCATION= 'HOUT BAY')
```

	BNAME
1	Joy
2	SeaPride
3	Yuppie

17.

Get names that are in both the sailors and the captains relations.

```
SELECT SNAME FROM SAILORS WHERE EXISTS
(SELECT * FROM CAPTAINS WHERE CAPTAINS.SID= SAILORS.SID)
```

SNAME

18.

Get names of boats that have exactly 1 reservation.

```
SELECT BNAME FROM BOATS AS B WHERE UNIQUE
(SELECT BID FROM RESERVES WHERE RESERVES.BID=B.BID)
```

```
Msg 156, Level 15, State 1, Line 167
Incorrect syntax near the keyword 'UNIQUE'.

Completion time: 2023-08-26T20:44:32.6081415-05:00
```

The above error persists in both Microsoft SQL Server and MySQL when running the professors' code so our group attempted a different approach shown below.

Our Approach:

```
SELECT BNAME FROM BOATS, RESERVES
WHERE BOATS.BID = RESERVES.BID
GROUP BY BNAME
HAVING COUNT(RESERVES.BID) = 1
```

	BNAME
1	Joy
2	SeaPride

19.

Get sailor ID and total deposit paid for sailors who have booked more than 1 boat.

```
SELECT SID, TOTAL_DEPOSIT FROM
(SELECT SID, COUNT(BID), SUM(DEPOSIT)
FROM RESERVES
WHERE DEPOSIT IS NOT NULL AND DEPOSIT > 0 GROUP BY SID)
RESULT (SID, NUM_BOATS, TOTAL_DEPOSIT) WHERE NUM_BOATS>1
```

	SID	TOTAL_DEPOSIT
1	23	240
2	27	220

20.

Get all reservation info including details of the boat booked.

```
SELECT * FROM BOATS
INNER JOIN RESERVES ON BOATS.BID= RESERVES.BID
```

	SID	BID	Day	Deposit	Bname	BID	Fee	Location
1	23	108	2014-08-08	120	SeaPride	108	500	Fish Hoek
2	23	109	2014-08-01	120	Wayfarer	109	120	Hout Bay
3	25	101	2014-08-08	0	Yuppie	101	400	Hout Bay
4	27	101	2014-08-09	100	Yuppie	101	400	Hout Bay
5	27	109	2014-08-15	120	Wayfarer	109	120	Hout Bay
6	33	104	2014-09-11	0	Joy	104	200	Hout Bay
7	33	109	2014-09-04	0	Wayfarer	109	120	Hout Bay

21.

Get all information on every boat. If a boat has reservations, including all its reservations info.

```
SELECT * FROM BOATS
LEFT OUTER JOIN RESERVES ON BOATS.BID = RESERVES.BID
```

Bname	BID	Fee	Location	SID	BID	Day	Deposit
Yuppie	101	400	Hout Bay	25	101	2014-08-08	0
Yuppie	101	400	Hout Bay	27	101	2014-08-09	100
Joy	104	200	Hout Bay	33	104	2014-09-11	0
SeaPride	108	500	Fish Hoek	23	108	2014-08-08	120
Wayfarer	109	120	Hout Bay	23	109	2014-08-01	120
Wayfarer	109	120	Hout Bay	27	109	2014-08-15	120
Wayfarer	109	120	Hout Bay	33	109	2014-09-04	0

22.

Create a new tuple for the boat named “Nino” which has fee R150, BID 110, and is in Fish Hoek.

```
INSERT INTO BOATS VALUES ('Nino', 110,150, 'Fish Hoek')
select * from boats
```

100 %

Results Messages

	Bname	BID	Fee	Location
1	Yuppie	101	400	Hout Bay
2	Joy	104	200	Hout Bay
3	SeaPride	108	500	Fish Hoek
4	Wayfarer	109	120	Hout Bay
5	Nino	110	150	Fish Hoek

23.

Remove all bookings from Reserves where there is no deposit.

```
DELETE from reserves where DEPOSIT IS NULL OR DEPOSIT = 0
```

```
SELECT * FROM RESERVES
```

00 %

Results | Messages

	SID	BID	Day	Deposit
1	23	108	2014-08-08	120
2	23	109	2014-08-01	120
3	27	101	2014-08-09	100
4	27	109	2014-08-15	120

24.

Increase the fee of every boat by 12%.

```
update boats
set fee = fee*1.12
```

```
(5 rows affected)
```

```
select * from boats
```

%

Results | Messages

Bname	BID	Fee	Location
Yuppie	101	448	Hout Bay
Joy	104	224	Hout Bay
SeaPride	108	560	Fish Hoek
Wayfarer	109	134	Hout Bay
Nino	110	168	Fish Hoek

25.

Make a view called Bookings which hides the Deposit value i.e. only has the other 3 attributes.

```
CREATE VIEW Bookings as
SELECT SID, BID, DAY FROM RESERVES;
```

Messages

```
Commands completed successfully.

Completion time: 2023-08-26T21:23:23.1266369-05:00
```

```
SELECT * FROM BOOKINGS
```

100 %

Results | Messages

	SID	BID	DAY
1	23	108	2014-08-08
2	23	109	2014-08-01
3	27	101	2014-08-09
4	27	109	2014-08-15

26.

Create a table called Reserves with 3 integer attributes BID, SID & deposit, and a date attribute. Allow only deposit to be omitted, and ensure SID and BID values exist in the database. When someone books a boat it is for the whole day.

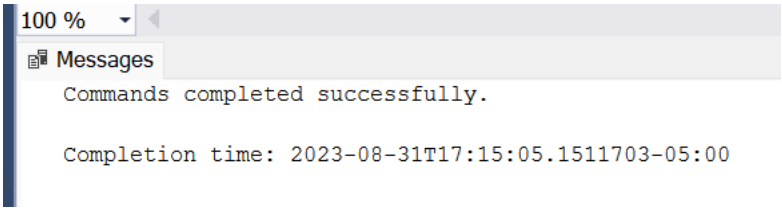
```
CREATE TABLE RES
(BID INTEGER NOT NULL,
SID INTEGER NOT NULL,
DAY DATETIME NOT NULL,
DEPOSIT INTEGER,
PRIMARY KEY (BID,SID),
CHECK(BID IN (SELECT BID FROM BOATS)), CHECK(SID IN (SELECT SID FROM
SAILORS)))
```

```
Msg 1046, Level 15, State 1, Line 222
Subqueries are not allowed in this context. Only scalar expressions are allowed.
Msg 102, Level 15, State 1, Line 222
Incorrect syntax near ')'.
```

The above error persists in both Microsoft SQL Server and MySQL when running the professors' code so our group attempted a different approach shown below.

Our approach:

```
CREATE TABLE RESERVES
(BID INTEGER NOT NULL,
SID INTEGER NOT NULL,
DAY DATETIME NOT NULL,
DEPOSIT INTEGER,
PRIMARY KEY (BID,SID),
Constraint FK_Reserves_SID foreign key (SID) references Sailors (SID),
Constraint FK_Reserves_BID foreign key (BID) references Boats(BID));
```



27.

Add a new attribute NEEDSREPAIR to the Boats table. It is usually “N”.

```
ALTER TABLE BOATS
ADD NEEDSREPAIR CHAR(1) DEFAULT 'N'
```

```
SELECT * FROM BOATS
```

100 %

Results | Messages

	Bname	BID	Fee	Location	NEEDSREPAIR
1	Yuppie	101	448	Hout Bay	NULL
2	Joy	104	224	Hout Bay	NULL
3	SeaPride	108	560	Fish Hoek	NULL
4	Wayfarer	109	134	Hout Bay	NULL
5	Nino	110	168	Fish Hoek	NULL

28.

We should not be ageist. Remove the Age attribute.

```
ALTER TABLE SAILORS
DROP COLUMN AGE
```

```
SELECT * FROM SAILORS
```

100 %

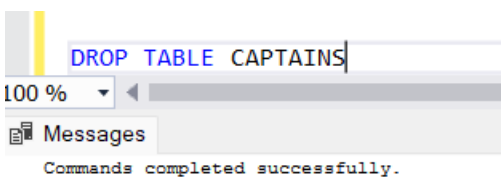
Results | Messages

	Sname	SID	Rating
1	Marxs	23	8
2	Martin	25	9
3	Adams	27	8
4	Carrey	33	10

29.

Remove the Captains relation altogether so that nobody can try insert or use Captains in future.

```
DROP TABLE CAPTAINS
```




```
SELECT * FROM CAPTIANS
```

0 %

Messages

```
Msg 208, Level 16, State 1, Line 243
Invalid object name 'CAPTIANS'.

Completion time: 2023-08-26T21:44:04.3218843-05:00
```

Relational Algebra

2. $\Pi_{SID,Rating*10,Age}(Sailors)$

8. $\Pi_{BID}(Boats) - \Pi_{BID}(Reserves)$

9. $\sigma_{Reserves.BID=Boats.BID}(Reserves\ X\ Boats)$

10.
$\Pi_{Sname,Day,Bname}(\sigma_{Sailors.SID=Reserves.SID,Reserves.BID=Boats.BID}(Sailors\ X\ Reserves\ X\ Boats))$

17. $\Pi_{Sname}(Sailors) \cap \Pi_{Sname}(Captains)$

20. $Boats \bowtie_{Boats.BID=Reserves.BID} Reserves$