

CS246: Database Management Systems Lab
Lab Exam (9 Questions, 119 Marks)

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Date: 17-Apr-2025

Time: 07:55 hrs to 08:55 hrs (Slot C)

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55

Lab Exam

1. SQL Statements with syntax errors will get 0 marks.

2. C code snippet with syntax errors will get 0 marks.

Question 1 12 Mark

Week 03 The input file named week03-input.txt contains 444 lines; each line is of the following format
 BOM HYD 6E5056 21:30 22:55.

1. (2 marks) How do you store one line of this data into C structures? Assume flight number is of 6 characters long, origin and destination are 3 characters long, represent departure and arrival time in a separate structure.

~~struct data {
 char flight-no[6];
 char origin[3];
 char dest[3];
 struct time arr;
 struct time dep;
 };~~

~~struct time {
 int hour;
 int min;
 };~~

loop of i from 0 - 443
 and array

struct data data[444];

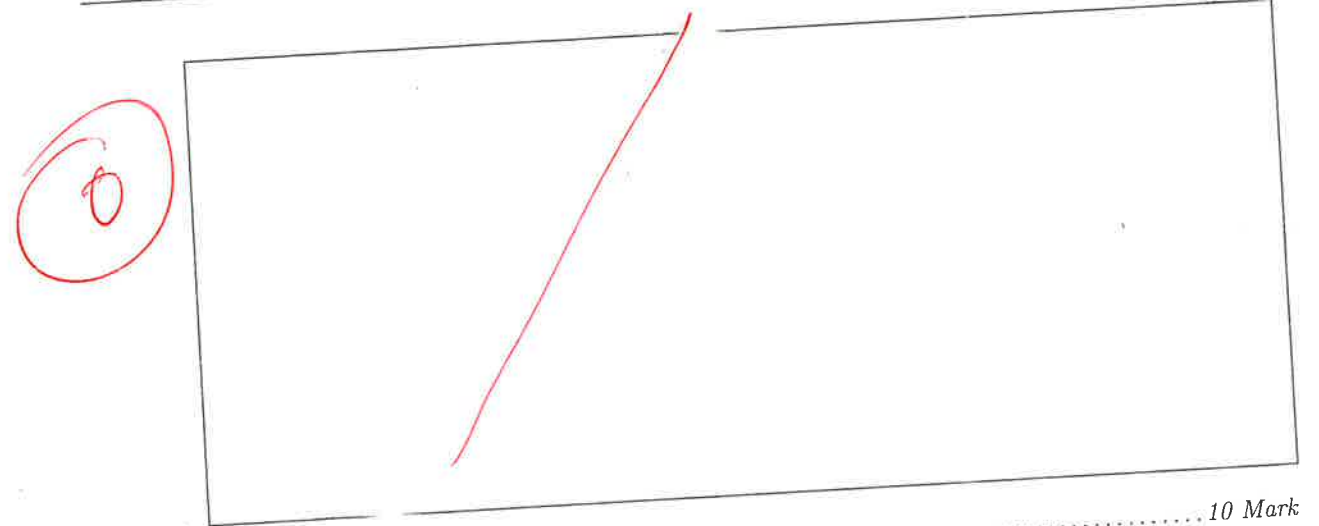
scanf("%s %s %s %d:%d %d:%d",
 data[i].~~origin~~, data[i].dest, data[i].flight-no,
 data[i].~~dep~~ hour, data[i].dep.
 min,
 data[i].arr.hour,
 data[i].arr.min);

2. (2 marks) How do you store all 444 lines of input data into C structure?

struct data data[444];

3. (8 marks) Write the C function two_hop which takes appropriate input arguments and list all two hop flights from origin=GAU to destination=MAA. Assume (1) the output is displayed on to the standard output (2) data is read in the main function (3) there are no global variables.


- (2 marks) Correct input arguments
- (1 mark) Correct return data type
- (5 marks) logic for computing all two hop flights from origin=GAU to destination=MAA.



10 Mark

Question 2
Week 04 Data Definition Language

1. (2 marks) Create a table T2 containing the following columns
 - (a) 1st column is of fixed length char data type of length 3 denoting origin
 - (b) 2nd column is of fixed length char data type of length 3 denoting destination
 - (c) 3rd column is of fixed length char data type of length 6 denoting flight number (fno) . Place primary key constraint.
 - (d) 4th column is of fixed length char data type of length 5 denoting departure time from origin airport
 - (e) 5th column is of fixed length char data type of length 5 denoting arrival time at destination airport



```

CREATE TABLE T2 (
  Origin CHAR(3),
  Destination CHAR(3),
  fno CHAR(6) PRIMARY KEY,
  Dep-time CHAR(5),
  Arr-time CHAR(5)
);
  
```

2. (1 mark) What will be the output of following SQL statement
 INSERT INTO T2(origin, destination, fno, departure, arrival)
 VALUES('MOBOM', 'DYHYD', '6E505-6E6056', '21:30', '22:55');
 A. MOB. DYH. 6E505-, 21:30. 22:55
 B. BOM. HYD. 6E6056, 21:30. 22:55
 C. OBO. YHY. 6E505-. 21:30. 22:55
☒ D. Insertion results in error
3. (1 mark) Write the MySQL Update statement which change the destination of flight number 6E5056 to HYD

```
UPDATE T2 SET Destination = 'HYD' WHERE fno = '6E5056';
```

4. (1 mark) Write the MySQL Delete statement to delete a record having value flight number 6E5367

```
DELETE FROM T2 WHERE fno = '6E5367';
```

5. (3 marks) Perform the following

- (a) (1 mark) Create a table T7 containing only one column flight number (fno) of char data type of fixed length 6.

```
CREATE TABLE T7 (fno CHAR(6));
```

- (b) (2 marks) Modify the table T7 to add column origin of char data type of fixed length 3 to table T7.

```
ALTER TABLE T7 ADD COLUMN origin CHAR(3);
```

Question 3 5 Mark
Week 05 Given the following table chess_moves

1 st column	mno	int data type
2 nd column	player	fixed length char of size 10
3 rd column	piece	fixed length char of size 10
4 th column	start_square	fixed length char of size 2
5 th column	end_square	fixed length char of size 2
6 th column	is_capture	tinyint data type
7 th column	is_castling	tinyint data type
8 th column	is_check	tinyint data type
9 th column	is_check_mate	tinyint data type
10 th column	is_promoted	tinyint data type

1. mno Move number
2. player take value from the set {white, black}
3. piece take values from the set {pawn, rook, knight, bishop, queen, king}
4. start_square take value from the set: {a, b, c, d, e, f, g, h} × {1, 2, 3, 4, 5, 6, 7, 8}

5. `end_square` take value from the set: $\{a, b, c, d, e, f, g, h\} \times \{1, 2, 3, 4, 5, 6, 7, 8\}$
6. `is_capture` take value from the set: $\{0, 1\}$
7. `is_castling` take value from the set: $\{0, 1\}$
8. `is_check` take value from the set: $\{0, 1\}$
9. `is_check_make` take value from the set: $\{0, 1\}$
10. `is_promoted` take value from the set: $\{0, 1\}$

Assuming that data is populated into this table, write the SQL statements for the following queries

1. (1 mark) List all white's rook moves

```
SELECT * FROM chess-moves WHERE player = 'white';  
AND piece = 'rook';
```

2. (1 mark) List all white kings moves

```
SELECT * FROM chess-moves WHERE player = 'white' AND  
piece = 'king';
```

3. (1 mark) How many black pieces were killed by white?

```
SELECT COUNT(*) FROM chess-moves WHERE player = 'white' AND  
is_capture = 1;
```

4. (1 mark) How many white pieces were killed by black rook?

```
SELECT COUNT(*) FROM chess-moves WHERE player = 'black'  
AND piece = 'rook' AND  
is_capture = 1;
```

5. (1 mark) List all black's queen moves

```
SELECT * FROM chess-moves WHERE player = 'black'
AND piece = 'queen';
```

Question 4 10 Mark

Week 07 Assume that the following tables exists and data is successfully populated

```
myapp_user(user_id, name, email, phone, city, primary key(user_id))
restaurant(restaurant_id, name, location, rating, primary key(restaurant_id))
my_order(order_id, user_id, restaurant_id, order_date, amount, primary key(order_id))
menu(menu_id, restaurant_id, dish_name, price)
review(review_id, user_id, restaurant_id, rating, review_text)
```

1. (5 marks) List all the user name's who never placed an order

```
SELECT name FROM myapp-user WHERE user-id
NOT IN (SELECT user-id FROM my-order);
```

2. (5 marks) List all restaurant name's that do not have any menu item

```
SELECT name FROM restaurant WHERE restaurant-id
NOT IN (SELECT restaurant-id FROM
        menu);
```


Question 5 20 Mark

Week 08 Views

(13) sailor(sid, sname, rating, age, primary key(sid));
 boat(bid, bname, bcolor, primary key(bid));
 reserves(sid, bid, day, primary key(sid, bid, day),
 foreign key(sid) references sailor(sid) cascade on delete cascade on update,
 foreign key(bid) references boat(bid) cascade on delete cascade on update);

sailor table data	reserves table data	boat table data
22,Dustin,7,45	22,101,1998-10-10	101,Interlake,blue
29,Brutus,1,33	22,102,1998-10-10	102,Interlake,red
31,Lubber,8,55.5	22,103,1998-10-08	103,Clipper,green
32,Andy,8,25.5	22,104,1998-10-07	104,Marine,red
58,Rusty,10,35	31,102,1998-11-10	
64,Horatio,7,35	31,103,1998-11-06	
71,Zorba,10,16	31,104,1998-11-12	
74,Horatio,9,35	64,101,1998-09-05	
85,Art,3,25.5	64,102,1998-09-08	
95,Bob,3,63.5	74,102,1998-09-08	

Assume:

- that the sailor data, boat data and reserves data is present in the table
- The view named v1 having columns sid, rating is created from sailor table.
- sailor table rating column is renamed to rting.

1. (3 marks) What will be the output of the following SQL statement
 SELECT * FROM v1;?

(3) Error since rating column used to create view does not exist.

2. (5 marks) Assuming the sailor has columns sid, sname, rating, age, write the SQL statement to create a view v4 with the columns sid, sname, rating, bid, bname containing sailor having maximum rating among the reserved boats.

CREATE VIEW v4 AS
 SELECT sid, sname, rating, age FROM sailor NATURAL
 JOIN reserves WHERE rating =
 (SELECT MAX(rating) FROM sailor NATURAL JOIN
 reserves);

3. (6 marks) Given the following insert statement.

INSERT INTO v4(sid, sname, rating) VALUES(80, 'best sailor', 10);

what effect the insert statement will have on sailor? boat? v4? Write only the change that take place due to this insert statement on these three tables:
sailor

② Error on insert. No change

boat

② Error on insert. No change

v4

② Error on insert. No change.

4. (6 marks) Given the following insert statement,

INSERT INTO v4(sid, sname, rating, bid, bname) VALUES(81, 'bsailor', 10, 110, 'blue-king');

What effect the insert statement will have on sailor? boat? v4? Write only the change that take place due to this insert statement on these three tables:
sailor

② Error on insert. No change

boat

② Error on insert. No change

v4

② Error on insert. No change

Question 6 25 Mark

Week 10 Given the schema and the data

sailors(sid, sname, rating, age, primary key(sid))
boats(bid, bname, bcolor, primary key(bid))

reserves(sid int, bid int, day date, primary key(sid, bid, day),
foreign key (sid) references sailors(sid) on update cascade on delete cascade,
foreign key(bid) references boats(bid) on update cascade on delete cascade);

sailors_log(sid, event_ba, ops, date_time)
boats_log(bid, event_ba, ops, date_time)
reserves_log(sid, bid, day, event_ba, ops, date_time)

sailor table data:	reserves table data	boat table data
22,Dustin,7,45	22,101,1998-10-10	101,Interlake,blue
29,Brutus,1,33	22,102,1998-10-10	102,Interlake,red
31,Lubber,8,55.5	22,103,1998-10-08	103,Clipper,green
32,Andy,8,25.5	22,104,1998-10-07	104,Marine,red
58,Rusty,10,35	31,102,1998-11-10	
64,Horatio,7,35	31,103,1998-11-06	
71,Zorba,10,16	31,104,1998-11-12	
74,Horatio,9,35	64,101,1998-09-05	
85,Art,3,25.5	64,102,1998-09-08	
95,Bob,3,63.5	74,102,1998-09-08	

1. (5 marks) Create a trigger on sailors table. Whenever a row is deleted from this table, and after the row is deleted this trigger should insert a record into sailors_log table with sid of the row about to be inserted, event_ba="after", ops="delete".

```

DELIMITER /
CREATE TRIGGER t1 AFTER DELETE ON sailors
FOR EACH ROW
BEGIN
    INSERT INTO sailors_log VALUES (
        OLD.sid, 'after', 'delete', SYS TIME());
END; /
DELIMITER ;

```

↳ function which gives present time can be made

2. (5 marks) Create a trigger on boat table. Whenever a row is updated, and after the row is updated this trigger should insert a record into boat_log table with bid of the row about to be updated, event_ba="after", ops="update"

```

DELIMITER /
CREATE TRIGGER t2 AFTER INSERT ON boat
FOR EACH ROW
BEGIN
    INSERT INTO boat_log VALUES (OLD.bid, 'after', 'update',
        SYS TIME());
END; /
DELIMITER ;

```

3. (7 marks) Given that the following two statements are executed executed

```

DELETE FROM sailor where sid=31;
UPDATE boat set bid=110 where bid=101;

```


(1 mark) What will be the output `SELECT * FROM sailors_log;`

sid	event-ta	ops	date-time
31	after	delete	(--> time of delete & date)

(1 mark) What will be the output `SELECT * FROM boats_log;`

bid	event-ta	ops	date-time
101	after	update	(--> time of update & date)

(6 marks) What will be the output of `SELECT * FROM reserves;`

sid	bed	day
22	101	1998-10-10
22	102	1998-10-10
22	103	1998-10-08
22	104	1998-10-07
31	102	1998-11-10
31	103	1998-11-06
31	104	1998-11-12
64	101	1998-09-05
64	102	1998-09-08
74	102	1998-09-08

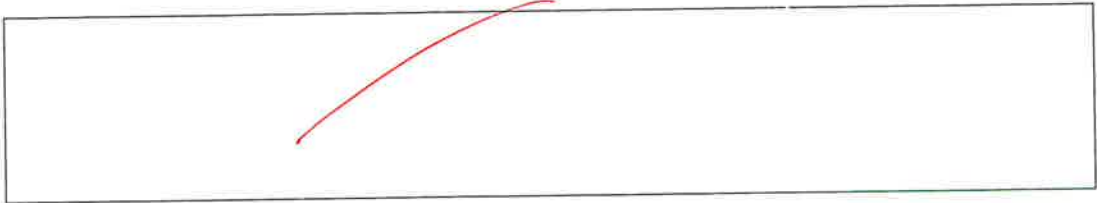
Question 7 15 Mark
Week 11 Embedded SQL:

1. (5 marks) Write a stored function which takes no input arguments and has one return value of string data type in the date format YYYY-MM-DD. For this consider generating DD part randomly, MM part randomly and YYYY to be 2025. Make sure to check the constraint on DD given MM. For example, if MM = 2 then DD cannot take values 30 and 31.

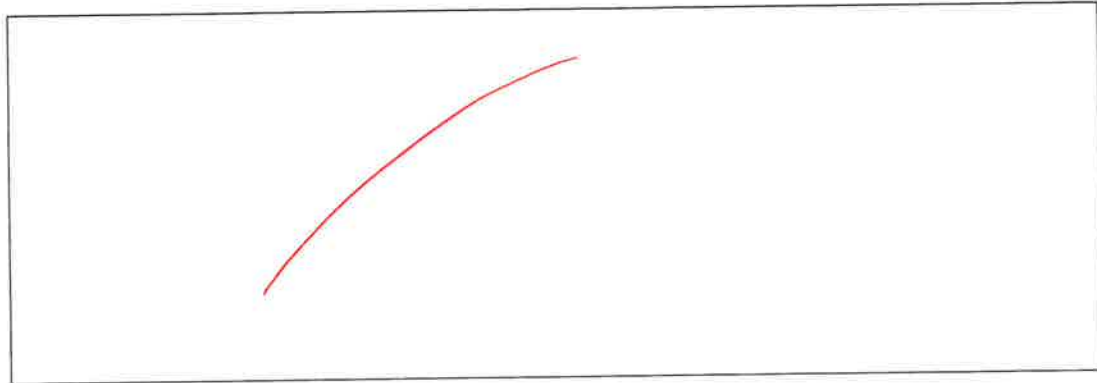
```

DELIMITER /
CREATE FUNCTION random-date() CHAR(10)
BEGIN
    RETURN CONCAT('2025-',
  
```

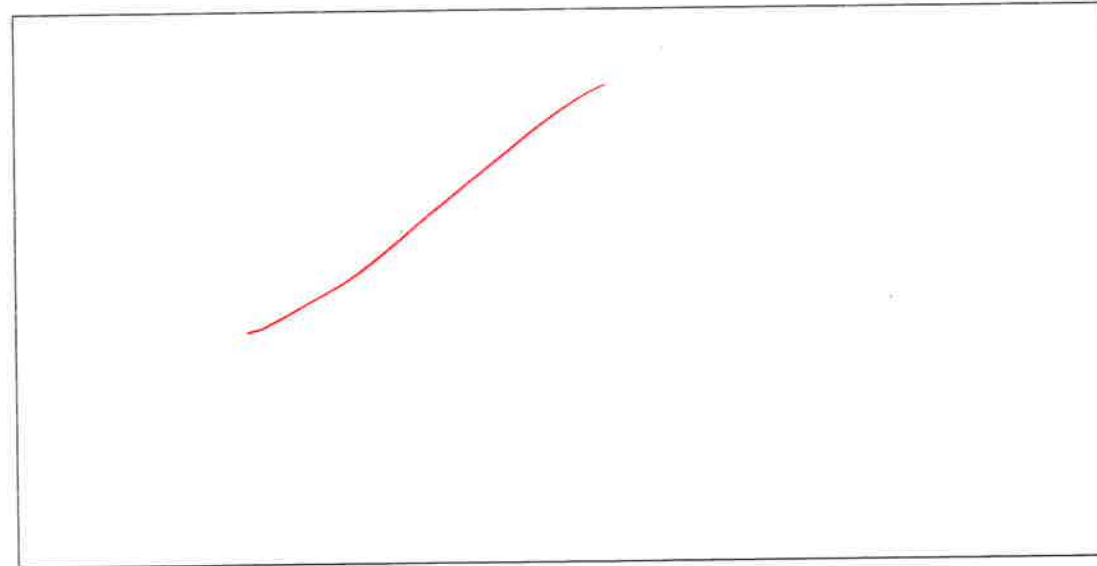
2. (2 marks) Write the code snippet for the database C API to establish connection to MySQL server with the following parameters:
- ```
server: localhost
user: root
password: root123
database name: cs246
```



3. (2 marks) Write the database C API which creates a view having columns sid, age, bcolor for the query Find the sailors with age over 20 who have not reserved a red boat.

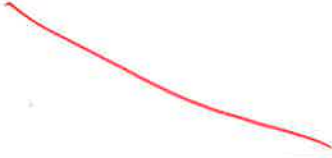


4. (6 marks) Using C API's demonstrate how do you retrieve records and print all the records from the view created above. Present the relevant C code snippet.




Question 8 ..... 10 Mark  
Week 12 Database replication:


1. (1 mark) How do you stop a MySQL server?



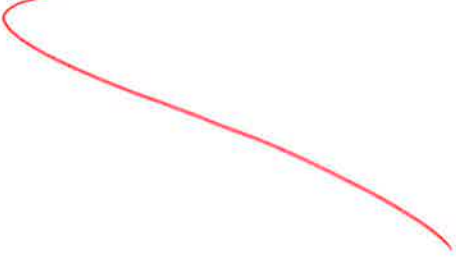
2. (1 mark) On ubuntu which directory the file `mysqld.conf` resides?



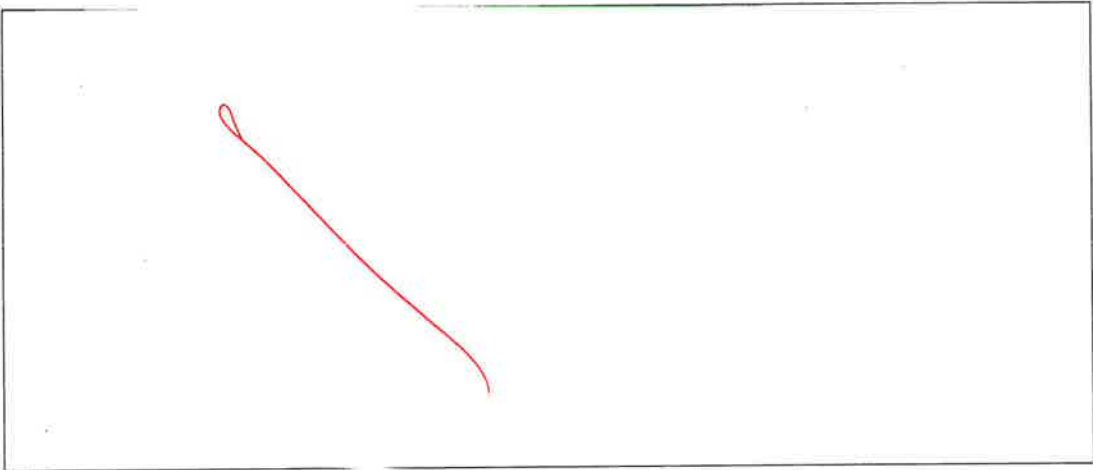
3. (1 mark) On Master, which variable you will initialize to state you want to replicate `week12a` database with slaves?



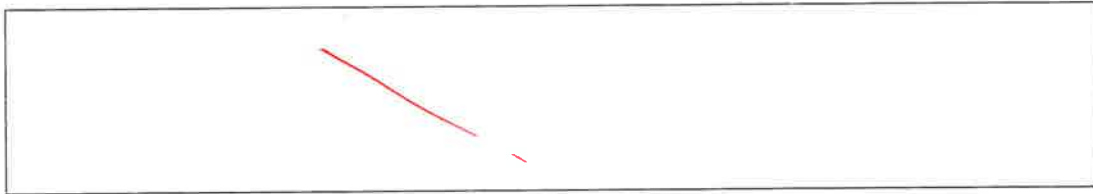
4. (2 marks) Create a user `ipl_csk` with password `ipl_csk_season10` on master machine



5. (2 marks) From Slave machine MySQL client how to connect to Master server with IP: 172.16.113.246 as `ipl_csk` user, `ipl_csk_season10` as password, file name is `mysql-bin.000001` and position is 899?



6. (3 marks) To replicate week12b.reserve\_details table slaves, how do you specify that the table week12b.reserve\_details is shared by master server in the slave configuration file?



Question 9..... 12 Mark

**Week 13** Consider the tables exists and appropriate data is loaded.

```
location(location_id, city, state, country, primary key(location_id))
product(product_id, product_name, category, price, primary key(product_id))
sale(product_id, time_id, location_id, sales, primary key(product_id, time_id, location_id))
```

Given the above, construct a pivot table year\_state\_02

|                  | WI  | CA  | Total |
|------------------|-----|-----|-------|
| 1995             | 63  | 81  | 144   |
| 1996             | 38  | 107 | 145   |
| 1997             | 75  | 35  | 110   |
| year_state_02_01 |     |     |       |
| year_state_02_02 |     |     |       |
| Total            | 176 | 223 | 399   |
| year_state_02_03 |     |     |       |
| year_state_02_04 |     |     |       |

1. (3 marks) Write a single query using sale, location tables to generate year\_state\_02\_01

```

CREATE TABLE year_state_02_01 AS
SELECT time_id AS year,
SELECT SUM(CASE BEGIN state='WI' sales ELSE 0 END) AS WI,
SELECT SUM(CASE BEGIN state='CA' sales ELSE 0 END) AS CA
FROM location NATURAL JOIN sales;

```

3

2. (3 marks) Write a single query using year\_state\_02\_01 table to generate year\_state\_02\_02

```

CREATE TABLE year_state_02_02 AS
SELECT 'Total' AS row_name,
SELECT SUM(WI) AS WI,
SELECT SUM(CA) AS CA
FROM year_state_02_01;

```

3. (3 marks) Write a single query using year\_state\_02\_01 table to generate year\_state\_02\_03

```

CREATE TABLE year_state_02_03 AS
SELECT 'Total' AS row_name,
SELECT SUM(WI) AS WI,
SELECT SUM(CA) AS CA
FROM year_state_02_01;

```

3

4. (3 marks) Write a single query using either year\_state\_02\_02 or year\_state\_02\_03 to generate year\_state\_02\_04



~~SELECT SUM(Total)~~

CREATE TABLE year-state-02-04 AS

SELECT SUM(Total) AS Total-1 FROM  
year-state-02-02 ;

3

week 3 → 24

week 4 — 8

week 5 — 4

week 8 — 13

week 12 — 0

week 10 — 7

week 7 → 10

09 — 9

week 11 → 10