



Academic Year: 2022-2023

Name:	Prerna Sunil Jadhav
Sap Id:	60004220127
Class:	T. Y. B.Tech (Computer Engineering)
Course:	Advanced Database Management System Laboratory
Course Code:	DJ19CEEL5012
Experiment No.:	02

AIM: Simulate Query optimization

The screenshot shows MySQL Workbench with a query executed. The query is:

```
SELECT a.Organization_Id, b.Nam as More_Emp, a.Nam  
as Less_Emp  
FROM Dhruvi a, Dhruvi b  
WHERE a.Number_of_employees < b.Number_of_employees
```

The results grid shows a list of organizations with their employee counts. The output pane shows the execution plan for the query, indicating that the query is not optimized.

Optimised:

The screenshot shows MySQL Workbench with the same query executed, but with the 'OPTIMIZE TABLE Dhruvi;' statement added at the beginning. The query is now:

```
OPTIMIZE TABLE Dhruvi;  
SELECT Nam FROM Dhruvi WHERE Founded = "2019";  
SELECT sum(Number_of_employees) from Dhruvi WHERE Industry = "Farming";  
SELECT Nam, Country from Dhruvi order by (Country) desc;  
SELECT Organization_Id, Nam FROM Dhruvi where Organization_Id in (select Organization_Id from Dhruvi where Nam like 'a%');  
SELECT a.Organization_Id, b.Nam as More_Emp, a.Nam  
as Less_Emp  
FROM Dhruvi a, Dhruvi b  
WHERE a.Number_of_employees < b.Number_of_employees
```

The results grid shows the same list of organizations. The output pane shows the execution plan for the optimized query, indicating that the query is now optimized.



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MySQL Workbench interface showing a SQL script with 14 queries. The results grid displays the output of the queries, including a list of organizations and their employee counts.

Organization_Id	More_Emp	Less_Emp
2b4e6a3d9f472a	Acevedo LLC	Curtis Inc
F2ab8E6A6E6969	Acevedo LLC	Pace PLC
E5e2a6c396c6d	Acevedo LLC	Hanna Cain
BAB0FF1e2f8b1d	Acevedo LLC	Vance Ltd
4C0F81419a0E8E	Acevedo LLC	Huff Inc
C6d4033c1498d4	Acevedo LLC	Charles Inc
207DF1eC73803d	Acevedo LLC	Hopkins-Callahan
E29a8dab7FE0d4	Acevedo LLC	Booth, Kemp and Terrell
C4e6CB5AA23dA6	Acevedo LLC	Padilla, Baldwin and Robertson
S1Ck91dE358809A	Acevedo LLC	Hurst-Barajas
Immae357W97W97	Acevedo LLC	Cramer-Schmidt

Indexed:

MySQL Workbench interface showing a SQL script with 12 queries. The results grid displays the output of the queries, including a list of organizations and their employee counts.

Organization_Id	More_Emp	Less_Emp
00021ebdaFC6Ed	Schmitt, Brown and Moss	Blackburn Group
00021ebdaFC6Ed	Cameron-Dean	Blackburn Group
00021ebdaFC6Ed	Walton, Hopkins and Tucker	Blackburn Group
00021ebdaFC6Ed	Dillon-Mata	Blackburn Group
00021ebdaFC6Ed	Cole-Downs	Blackburn Group
00021ebdaFC6Ed	Cabrera LLC	Blackburn Group
00021ebdaFC6Ed	Caldwell, Merritt and Booth	Blackburn Group
00021ebdaFC6Ed	Hood Ltd	Blackburn Group
00021ebdaFC6Ed	Pham, Myers and Winney	Blackburn Group



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Experiment No.:	03

AIM: Implement Query Monitor

The screenshot displays the MySQL Workbench interface. The central pane shows a query execution plan for a join operation. The query is as follows:

```
1. SELECT * FROM dhruvi.organizations;
2.
3. SELECT a.Index, b.Name as More_Emp, a.Name
4. as Less_Emp
5. FROM dhruvi.organizations a, dhruvi.organizations b
6. WHERE a.Founded < b.Founded;
```

The execution plan visualizes the query execution flow. It starts with two 'Full Table Scan' operations on the 'organizations' table, labeled 'a' and 'b'. These scans result in 80,95K rows each. These rows are then joined using a 'hash join' operation, which results in 827,285,118 rows. The query cost is 827285118.98. The plan is shown in the 'Visual Explain' tab, with other tabs like 'Display Info', 'Read + Eval cost', 'Overview', and 'View Source' available. The right sidebar shows the 'SQLAdditions' panel with a message: 'Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.' The bottom status bar shows the system time as 16:27 on 29-10-2023.



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Experiment No.:	04

AIM: Optimize using B and B+ trees

CODE:

```
from bintrees import FastRBTree
import random
import time

btree = FastRBTree()

random_numbers = [random.randint(1, 10000) for _ in range(10000)]
for number in random_numbers:
    btree[number] = None

print("B-tree contents:")
for key in btree:
    print(key)

search_value = int(input("Enter a number to search for: "))
start_time = time.time()
if search_value in btree:
    print(f"{search_value} is in the B-tree.")
else:
    print(f"{search_value} is not in the B-tree.")
end_time = time.time()

search_time = end_time - start_time
print(f"Search took {search_time:.6f} seconds.")
```



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OUTPUT:

```
9997
9998
Enter a number to search for: 1000
1000 is in the B-tree.
Search took 2.644191 seconds.
```



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Experiment No.:	05

AIM: Perform Fragmentation (Range, List, Hash and Key)

CODE:

Number of records = 20

Partitioning by Range:

```
CREATE TABLE employees ( id INT NOT NULL,  
fname VARCHAR(30), lname VARCHAR(30),  
hired DATE NOT NULL DEFAULT '1970-01-01',  
store_id INT NOT NULL  
) PARTITION BY RANGE(store_id)(  
partition p0 values less than (3), partition p1 values less than (6), partition p2 values less than (9),  
partition p3 values less than (12)  
);
```

Partitioning by List:

```
CREATE TABLE employees2 ( id INT NOT NULL,  
fname VARCHAR(30), lname VARCHAR(30),  
hired DATE NOT NULL DEFAULT '1970-01-01',  
store_id INT NOT NULL ,  
PARTITION BY LIST(store_id)(  
partition p0 values in (1,4,6), partition p1 values in (2,3,8), partition p2 values in (5,7,9), partition p3  
values in (10,11,12)  
);
```

Result Grid	Filter Rows:	Export:	Wrap Cell Content:
	PARTITION_NAME	TABLE_ROWS	
▶	p0	6	
	p1	6	
	p2	4	
	p3	4	



Partitioning by Key:

```
CREATE TABLE employees3 (  
id INT NOT NULL PRIMARY KEY, fname VARCHAR(30), lname VARCHAR(30),  
hired DATE NOT NULL DEFAULT '1970-01-01',  
store_id INT NOT NULL  
) PARTITION BY KEY() PARTITIONS 4;
```

Result Grid	Filter Rows:	Export:	Wrap Cell Content:
	PARTITION_NAME	TABLE_ROWS	
▶	p0	5	
	p1	5	
	p2	5	
	p3	5	

Partitioning by Hash:

```
CREATE TABLE employees4 (  
id INT NOT NULL PRIMARY KEY, fname VARCHAR(30), lname VARCHAR(30),  
hired DATE NOT NULL DEFAULT '1970-01-01',  
store_id INT NOT NULL  
) PARTITION BY HASH(id) PARTITIONS 4;
```

	PARTITION_NAME	TABLE_ROWS	
▶	p0	5	
	p1	5	
	p2	5	
	p3	5	



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Experiment No.:	06

AIM: Implementations of two-phase protocol.

```
import time
import random
class Coordinator:
    def __init__(self, participants):
        self.participants = participants

    def send_prepare(self):
        votes = []
        for participant in self.participants:
            try:
                vote = participant.prepare()
                votes.append(vote)
            except Exception as e:
                print (f"Error during prepare phase: {str(e)}")
                self.send_abort()
        if all (votes):
            self.send_commit()
        else:
            self.send_abort()

    def send_commit(self):
        for participant in self.participants:
            try:
                participant.commit()
            except Exception as e:
                print (f"Error during commit phase: {str(e)}")
                self.send_abort()

    def send_abort(self):
        for participant in self.participants:
            try:
                participant.abort()
            except Exception as e:
                print (f"Error during abort phase: {str(e)}")
                self.send_abort()

class Participant:
    def __init__(self, name):
        self.name = name
```



```
def prepare(self):
    print (f"{self.name}: Prepare phase")
    time.sleep(random.uniform(0.5, 1.5))
    return True
def commit(self):
    print (f"{self.name}: Commit phase")
    time.sleep (random.uniform(0.5, 1.5))
    pass
def abort(self):
    print(f"{self.name}: Abort phase")
    time.sleep(random.uniform(0.5, 1.5))
    pass
```

```
participant1 = Participant("Participant1")
participant2 = Participant("Participant2")
coordinator = Coordinator([participant1, participant2])
try:
    coordinator.send_prepare()
    print("Transaction committed successfully!")
except Exception as e:
    print (f"Transaction aborted: {str(e)}")
```

OUTPUT:

```
Participant1: Prepare phase
Participant2: Prepare phase
Participant1: Commit phase
Participant2: Commit phase
Transaction committed successfully!
```



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Course Code:	DJ19CEEL5012
Experiment No.:	07

AIM: Query execution on XML database.

CODE:

```
<?xml version="1.0"?>
<catalog>
  <book id="bk101">
    <author>Gambardella, Matthew</author>
    <title>XML Developer's Guide</title>
    <genre>Computer</genre>
    <price>44.95</price>
    <publish_date>2000-10-01</publish_date>
    <description>An in-depth look at creating applications with XML.</description>
  </book>
  <book id="bk102">
    <author>Ralls, Kim</author>
    <title>Midnight Rain</title>
    <genre>Fantasy</genre>
    <price>5.95</price>
    <publish_date>2000-12-16</publish_date>
    <description>A former architect battles corporate zombies, an evil sorceress, and her own childhood to become queen of the world.</description>
  </book>
  <book id="bk103">
    <author>Corets, Eva</author>
    <title>Maeve Ascendant</title>
    <genre>Fantasy</genre>
    <price>5.95</price>
    <publish_date>2000-11-17</publish_date>
    <description>After the collapse of a nanotechnology society in England, the young survivors lay the foundation for a new society.</description>
  </book>
  <book id="bk104">
    <author>Corets, Eva</author>
    <title>Oberon's Legacy</title>
    <genre>Fantasy</genre>
    <price>5.95</price>
    <publish_date>2001-03-10</publish_date>
    <description>In post-apocalypse England, the mysterious agent known only as Oberon helps to create a new life for the inhabitants of London. Sequel to Maeve Ascendant.</description>
  </book>
  <book id="bk105">
    <author>Corets, Eva</author>
```



```
<title>The Sundered Grail</title>
<genre>Fantasy</genre>
<price>5.95</price>
<publish_date>2001-09-10</publish_date>
<description>The two daughters of Maeve, half-sisters, battle one another for control
of England. Sequel to Oberon's Legacy.</description>
</book>
<book id="bk106">
  <author>Randall, Cynthia</author>
  <title>Lover Birds</title>
  <genre>Romance</genre>
  <price>4.95</price>
  <publish_date>2000-09-02</publish_date>
  <description>When Carla meets Paul at an ornithology conference, tempers fly as feathers get
ruffled.</description>
</book>
<book id="bk107">
  <author>Thurman, Paula</author>
  <title>Splish Splash</title>
  <genre>Romance</genre>
  <price>4.95</price>
  <publish_date>2000-11-02</publish_date>
  <description>A deep sea diver finds true love twenty thousand leagues beneath the
sea.</description>
</book>
<book id="bk108">
  <author>Knorr, Stefan</author>
  <title>Creepy Crawlies</title>
  <genre>Horror</genre>
  <price>4.95</price>
  <publish_date>2000-12-06</publish_date>
  <description>An anthology of horror stories about roaches, centipedes, scorpions
and other insects.</description>
</book>
<book id="bk109">
  <author>Kress, Peter</author>
  <title>Paradox Lost</title>
  <genre>Science Fiction</genre>
  <price>6.95</price>
  <publish_date>2000-11-02</publish_date>
  <description>After an inadvertant trip through a Heisenberg Uncertainty Device, James Salway
discovers the problems
of being quantum.</description>
</book>
<book id="bk110">
  <author>O'Brien, Tim</author>
  <title>Microsoft .NET: The Programming Bible</title>
  <genre>Computer</genre>
  <price>36.95</price>
  <publish_date>2000-12-09</publish_date>
  <description>Microsoft's .NET initiative is explored in detail in this deep
programmer's reference.</description>
</book>
<book id="bk111">
  <author>O'Brien, Tim</author>
  <title>MSXML3: A Comprehensive Guide</title>
  <genre>Computer</genre>
```



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OUTPUT:

[View Information about the Books](#)

Search a title

Search an author

Search a genre

Search a price

Search a Publish Date

Title	Author	Genre	Price	Publish Date	
XML Developer's Guide	Gambardella, Matthew	Computer	44.95	2000-10-01	An in-depth look at creating applications with XML.
Midnight Rain	Ralls, Kim	Fantasy	5.95	2000-12-16	A former architect battles corporate zombies, an evil sorceress, and he
Maeve Ascendant	Corets, Eva	Fantasy	5.95	2000-11-17	After the collapse of a nanotechnology society in England, the young
Oberon's Legacy	Corets, Eva	Fantasy	5.95	2001-03-10	In post-apocalypse England, the mysterious agent known only as Ober
The Sundered Grail	Corets, Eva	Fantasy	5.95	2001-09-10	The two daughters of Maeve, half-sisters, battle one another for contro
Lover Birds	Randall, Cynthia	Romance	4.95	2000-09-02	When Carla meets Paul at an ornithology conference, tempers fly as f
Splash Splash	Thurman, Paula	Romance	4.95	2000-11-02	A deep sea diver finds true love twenty thousand leagues beneath the s
Creepy Crawlies	Knorr, Stefan	Horror	4.95	2000-12-06	An anthology of horror stories about roaches, centipedes, scorpions ar
Paradox Lost	Kress, Peter	Science Fiction	6.95	2000-11-02	After an inadvertant trip through a Heisenberg Uncertainty Device, Jan
Microsoft .NET: The Programming Bible	O'Brien, Tim	Computer	36.95	2000-12-09	Microsoft's .NET initiative is explored in detail in this deep programm
MSXML3: A Comprehensive Guide	O'Brien, Tim	Computer	36.95	2000-12-01	The Microsoft MSXML3 parser is covered in detail, with attention to
Visual Studio 7: A Comprehensive Guide	Galos, Mike	Computer	49.95	2001-04-16	Microsoft Visual Studio 7 is explored in depth, looking at how Visual

Result

Title	Author	Genre	Price	Publish Date	Description
Midnight Rain	Ralls, Kim	Fantasy	5.95	2000-12-16	A former architect battles corporate zombies, an evil sorceress, and her own childhood to become queen of the world



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Experiment No.:	08

AIM: Data handing using JSON

CODE:

```
const url = 'https://dummyjson.com/users';

fetch(url)
  .then(response => {
    if (response.ok) {
      return response.json();
    } else {
      throw new Error(`Error: ${response.status}`);
    }
  })
  .then(apiResponse => {
    const data = apiResponse.users;
    //Print all users
    console.log('All users:', data);

    const filteredUsers = data.filter(user => user.age > 25);
    const usernamesOver25 = filteredUsers.map(user => user.firstName);
    console.log('Users over 25:', usernamesOver25);

    const usersFromCity = data.filter(user => user.address.state === 'CA');
    const usersFromCA = usersFromCity.map(user => user.firstName);
    console.log('Users from California:', usersFromCA);

    const averageAge = data.reduce((sum, user) => sum + user.age, 0) / data.length;
    console.log('Average age of users:', averageAge);

    const oldestUser = data.reduce((oldest, user) => (user.age > oldest.age ? user : oldest), data[0]);
    console.log('Oldest user:', oldestUser.firstName);
  })
  .catch(error => {
    console.error(error.message);
  });
```



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OUTPUT:

```
Users over 25: [  
  'Terry',      'Sheldon',    'Terrill',  
  'Miles',      'Mavis',      'Oleta',  
  'Ewell',      'Eleanora',   'Marcel',  
  'Assunta',    'Trace',      'Jeanne',  
  'Trycia',     'Bradford',  'Arely',  
  'Gust',       'Lenna',     'Tressa',  
  'Felicity',  'Griffin',   'Piper',  
  'Kody',       'Macy',      'Maurine'  
]  
Users from California: [ 'Terrill', 'Oleta', 'Lenna',  
  'Macy' ]  
Average age of users: 34.86666666666667  
Oldest user: Terry
```




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Experiment No.:	09

AIM: Processing of Spatial and temporal data.

DATA:

```
mysql> select * from 2022_july;
```

start_date	start_time	distance	mode	confidence	Places
02-07-2022		18716	IN_PASSENGER_VEHICLE	MEDIUM	
06-07-2022	03:23:42	1669	MOTORCYCLING	LOW	
06-07-2022	03:35:46	11483	IN_TRAIN	LOW	
06-07-2022	03:58:13	1069	MOTORCYCLING	MEDIUM	
08-07-2022	03:11:39	461	MOTORCYCLING	LOW	
08-07-2022	03:26:15	1099	IN_PASSENGER_VEHICLE	LOW	
08-07-2022	03:42:42	7548	IN_TRAIN	MEDIUM	Anhad Misal
11-07-2022	03:48:22	1609	IN_BUS	MEDIUM	Kandivali Bus Station (W)
11-07-2022	04:11:17	9363	IN_TRAIN	MEDIUM	Agarkar Chowk
11-07-2022	04:39:15	2125	IN_SUBWAY	LOW	SAWMOHI BY MOKSHA & HIRAL
11-07-2022	04:48:18	896	IN_PASSENGER_VEHICLE	LOW	Trumpet Sky Lounge
11-07-2022	12:22:26	2972	IN_PASSENGER_VEHICLE	LOW	McDonald's
11-07-2022	12:48:32	9467	IN_TRAIN	MEDIUM	Kandivali Bus Depot
11-07-2022	13:10:00	2203	IN_PASSENGER_VEHICLE	LOW	State Bank of India
13-07-2022	03:19:59	905	WALKING	LOW	
13-07-2022	03:48:02	1896	IN_BUS	LOW	Kandivali Railway Station (W)
13-07-2022	04:04:12	9348	IN_TRAIN	MEDIUM	Agarkar Chowk / Pinky Cinema
13-07-2022	04:33:49	3270	IN_PASSENGER_VEHICLE	LOW	Lotus Business Park
13-07-2022	13:06:26	5297	IN_BUS	LOW	Villa Decor - Premium Bed, Bath & Mattresses Store
13-07-2022	13:44:17	11855	IN_TRAIN	LOW	Kandivali Station (W)
13-07-2022	14:15:27	1969	IN_PASSENGER_VEHICLE	MEDIUM	State Bank of India
14-07-2022	03:54:54	8949	IN_BUS	HIGH	
14-07-2022	04:39:02	578	WALKING	MEDIUM	UK Realty
14-07-2022	14:12:01	6005	IN_BUS	LOW	Yoko Sizzlers
14-07-2022	14:58:50	4087	UNKNOWN_ACTIVITY_TYPE	LOW	Xth Central Mall
15-07-2022	03:48:49	8500	IN_PASSENGER_VEHICLE	LOW	
15-07-2022	04:41:11	9105	IN_BUS	LOW	Rikā? - Terrace Bar & Grill
15-07-2022	14:15:09	5691	IN_BUS	MEDIUM	D Mart
15-07-2022	15:08:26	4933	IN_BUS	MEDIUM	La Pino'z Pizza Kandivali
16-07-2022	03:44:35	9838	IN_BUS	MEDIUM	Laxmi Industrial Colony
16-07-2022	13:08:07	2965	MOTORCYCLING	LOW	Andheri Station (W)
16-07-2022	13:32:44	9292	IN_TRAIN	MEDIUM	Kandivali West
16-07-2022	13:53:02	2074	IN_PASSENGER_VEHICLE	LOW	La Pino'z Pizza Kandivali
17-07-2022	08:38:08	880	MOTORCYCLING	LOW	Malad Industrial Estate
17-07-2022	10:23:08	1492	IN_PASSENGER_VEHICLE	LOW	Aadhar Center
17-07-2022	10:57:46	1294	MOTORCYCLING	MEDIUM	La Pino'z Pizza Kandivali
17-07-2022	11:38:53	5829	MOTORCYCLING	LOW	State Bank Of India ATM
18-07-2022	03:51:31	1292	IN_BUS	LOW	
18-07-2022	03:57:47	9400	IN_BUS	LOW	Anhad Misal

Queries -

- select * from 2022_july where start_time < "04:00:00";
- select * from 2022_july where distance > 10000;
- select * from 2022_july where Places = "Doolally Taproom - Andheri";



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OUTPUT:

TEMPORAL:

```
mysql> select * from 2022_july where start_time < "04:00:00";
```

start_date	start_time	distance	mode	confidence	Places
02-07-2022		18716	IN_PASSENGER_VEHICLE	MEDIUM	
06-07-2022	03:23:42	1669	MOTORCYCLING	LOW	
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08-07-2022	03:42:42	7548	IN_TRAIN	MEDIUM	Anhad Misal
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13-07-2022	03:19:59	905	WALKING	LOW	
13-07-2022	03:48:02	1896	IN_BUS	LOW	Kandivali Railway Station (W)
14-07-2022	03:54:54	8949	IN_BUS	HIGH	
15-07-2022	03:48:49	8500	IN_PASSENGER_VEHICLE	LOW	
16-07-2022	03:44:35	9838	IN_BUS	MEDIUM	Laxmi Industrial Colony
18-07-2022	03:51:31	1292	IN_BUS	LOW	
18-07-2022	03:57:47	9400	IN_BUS	LOW	Anhad Misal
19-07-2022	03:54:30	10085	IN_BUS	MEDIUM	Lotus Business Park
20-07-2022	03:32:29	1721	IN_BUS	MEDIUM	Bajaj Municipal School
20-07-2022	03:47:40	9487	IN_TRAIN	MEDIUM	Andheri Police Station
21-07-2022	03:46:02	8698	UNKNOWN_ACTIVITY_TYPE	LOW	Sun-n-Sand Hotel
23-07-2022	03:45:05	11590	IN_PASSENGER_VEHICLE	LOW	
25-07-2022	03:34:52	10629	IN_BUS	MEDIUM	Doolally Taproom - Andheri
26-07-2022	03:52:48	10072	IN_BUS	MEDIUM	Doolally Taproom - Andheri
27-07-2022	03:48:55	9483	IN_BUS	LOW	Doolally Taproom - Andheri
28-07-2022	03:29:48	9599	IN_BUS	MEDIUM	RikÅ? - Terrace Bar & Grill
29-07-2022	03:31:35	1948	MOTORCYCLING	LOW	Kandivali Bus Station (W)
29-07-2022	03:47:34	9579	IN_TRAIN	MEDIUM	

26 rows in set (0.00 sec)

SPATIAL:

```
mysql> select * from 2022_july where distance>10000;
```

start_date	start_time	distance	mode	confidence	Places
02-07-2022		18716	IN_PASSENGER_VEHICLE	MEDIUM	
06-07-2022	03:35:46	11483	IN_TRAIN	LOW	
13-07-2022	13:44:17	11855	IN_TRAIN	LOW	Kandivali Station (W)
19-07-2022	03:54:30	10085	IN_BUS	MEDIUM	Lotus Business Park
21-07-2022	18:59:35	41236	UNKNOWN_ACTIVITY_TYPE	LOW	Jay's Dosa & Paratha Center
23-07-2022	03:45:05	11590	IN_PASSENGER_VEHICLE	LOW	
24-07-2022	06:56:09	10674	MOTORCYCLING	LOW	Axis Bank ATM
25-07-2022	03:34:52	10629	IN_BUS	MEDIUM	Doolally Taproom - Andheri
26-07-2022	03:52:48	10072	IN_BUS	MEDIUM	Doolally Taproom - Andheri

9 rows in set (0.03 sec)

```
mysql> select * from 2022_july where Places="Doolally Taproom - Andheri";
```

start_date	start_time	distance	mode	confidence	Places
25-07-2022	03:34:52	10629	IN_BUS	MEDIUM	Doolally Taproom - Andheri
26-07-2022	03:52:48	10072	IN_BUS	MEDIUM	Doolally Taproom - Andheri
27-07-2022	03:48:55	9483	IN_BUS	LOW	Doolally Taproom - Andheri

3 rows in set (0.00 sec)