```python
import csv

import random

num_tuples = 2000

field_names = ['dept_num', 'dept_name', 'numemp', 'manager_id']

file_path = 'department_data.csv'

used_dept_nums = set()

with open(file_path, 'w', newline='') as csvfile:

    writer = csv.DictWriter(csvfile, fieldnames=field_names)

    writer.writeheader()

    for _ in range(num_tuples):

        while True:

            dept_num = random.randint(1000, 9999)

            dept_name = random.choice(["Data science", "Machine learning", "Databases", "Software engineering"])

            numemp = random.randint(10, 100)

            manager_id = random.randint(111111111, 888888888)

            if dept_num not in used_dept_nums:

                used_dept_nums.add(dept_num)

                writer.writerow({'dept_num': dept_num, 'dept_name': dept_name, 'numemp': numemp, 'manager_id': manager_id})

                break1

print(f"Generated {num_tuples} tuples with distinct dept_num and saved to {file_path}")
```

dept_num	dept_name	numemp	manager_id
4119	Databases	61	836794697
2403	Machine learning	72	598606470
8413	Machine learning	32	332163712
3751	Data science	98	199203378
8182	Databases	74	824886315
1394	Databases	81	723674369
7627	Databases	87	709704551
3244	Databases	19	769078550
4847	Machine learning	93	197443281
8401	Machine learning	83	230931837
9265	Databases	99	201279509
2900	Software engineering	69	783146798
1469	Data science	71	616644000
8100	Software engineering	28	346984473
7611	Machine learning	85	420041371
7051	Data science	22	783858307
9698	Machine learning	83	289929108
1257	Databases	33	239264459
8941	Software engineering	27	885447710

|	dept_num	dept_name	numemp	manager_id
1982	9026	Machine learning	10	843973164
1983	4485	Databases	89	766453885
1984	8921	Machine learning	55	758724839
1985	2795	Software engineering	77	614411744
1986	3265	Software engineering	93	122147288
1987	1164	Software engineering	84	635225249
1988	9336	Software engineering	43	291505558
1989	2793	Data science	22	859017426
1990	6817	Machine learning	50	686713216
1991	9932	Databases	43	880065108
1992	7636	Databases	45	403132717
1993	1569	Data science	20	390863821
1994	3471	Databases	22	644434544
1995	2390	Databases	56	225648656
1996	3304	Databases	100	663235912
1997	1649	Databases	78	664520295
1998	7017	Data science	72	720372763
1999	9155	Data science	66	583493466
2000	5291	Machine learning	29	395980316
2001	2382	Databases	84	457474319

Before Loading:
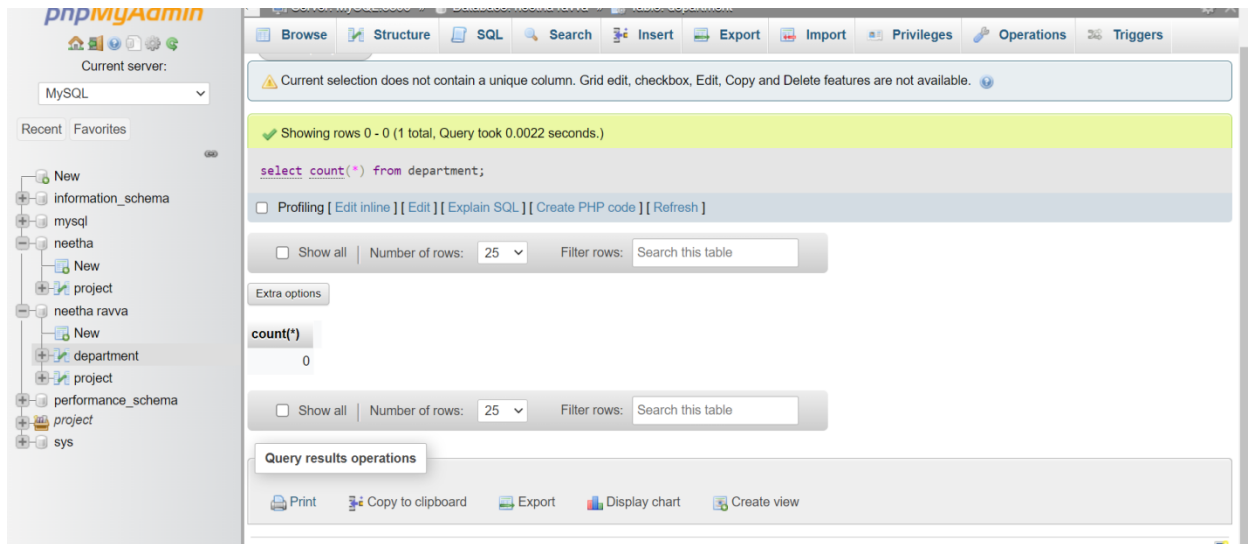
After Inserting rows:

LOAD DATA INFILE "C:/wamp64/tmp/Department_Data.csv" INTO TABLE department FIELDS TERMINATED BY ',' ENCLOSED BY '"' LINES TERMINATED BY '\n' ;
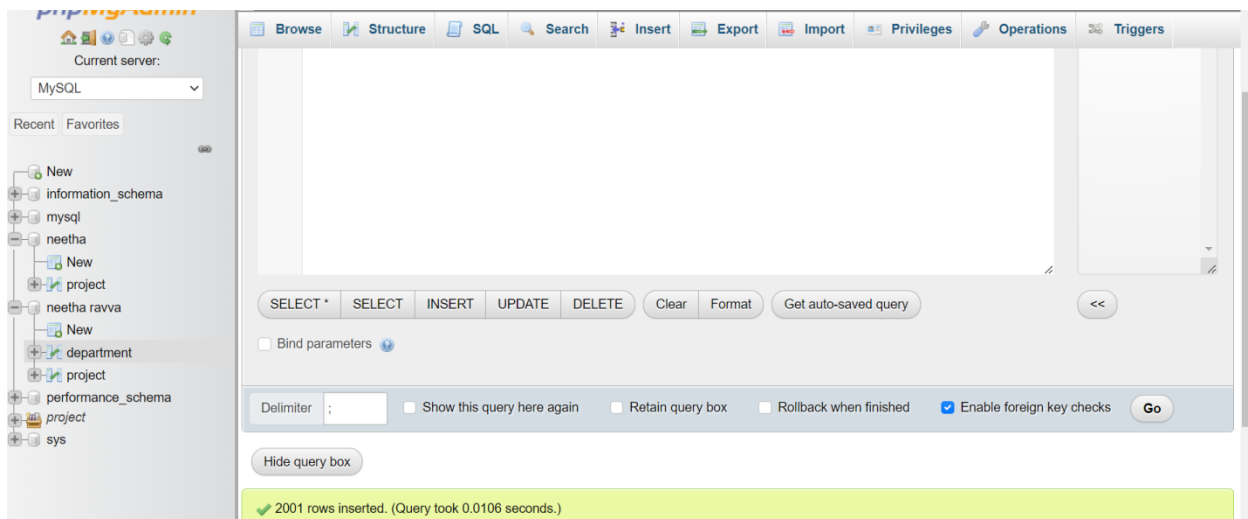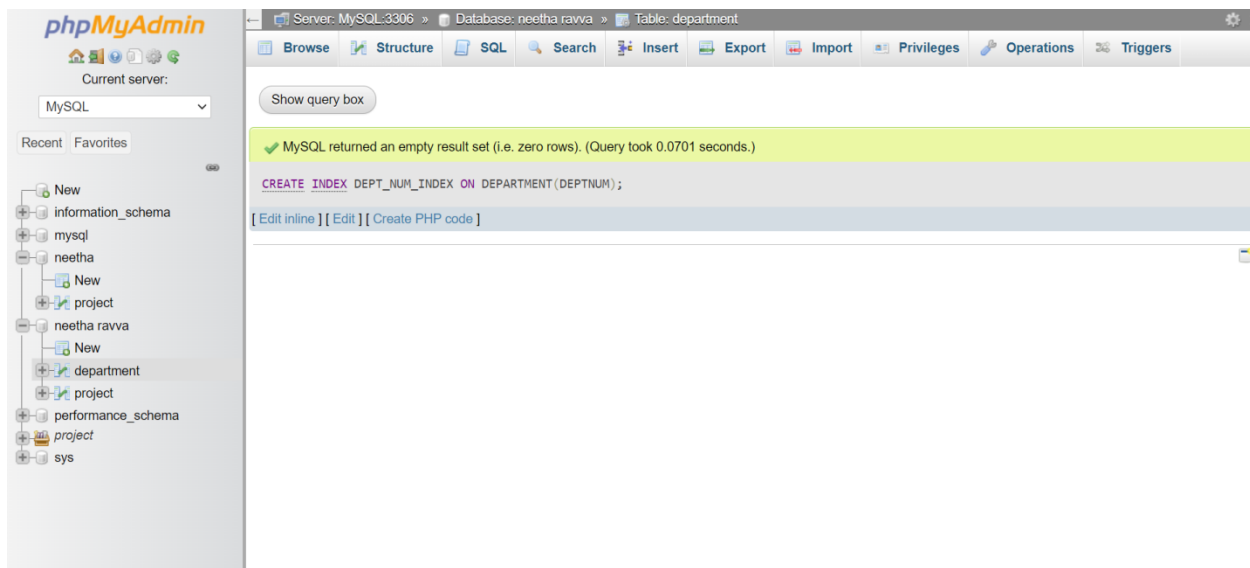

After Loading:
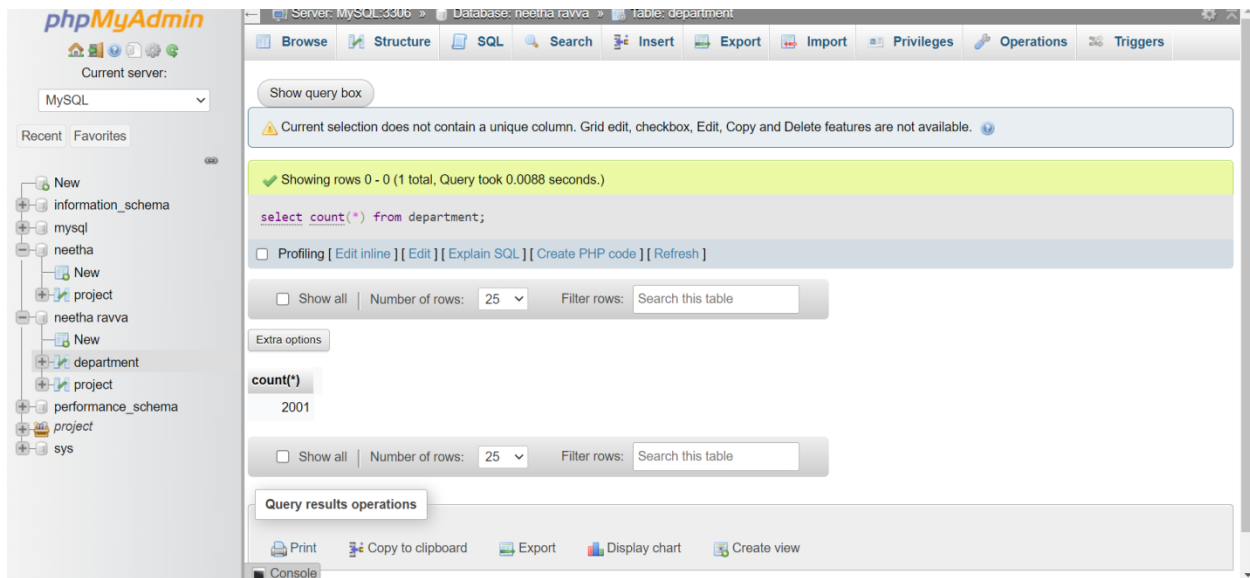
Creating an Index:

CREATE INDEX DEPT_NUM_INDEX ON DEPARTMENT(DEPTNUM) ;

select * from department where deptnum = 8413;

Dropping the Index Created:

select * from department where deptnum = 8413;

Sorting and Grouping: Indexes can be used to speed up the sorting and grouping of data. They allow the database to avoid time-consuming sorting operations by reading data in the order specified by the index.

Efficient Joins: When you join multiple tables, indexes on the join columns can greatly speed up the process. The database can use these indexes to locate the corresponding rows in each table, improving the overall query performance.

In the above screenshot, the running time is 0.0005 seconds without an index the running time is 0.0003 seconds.

4)Creating a View:

CREATE VIEW Department_View AS

SELECT deptnum,deptname,manager_id

FROM department;

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations | Triggers

SELECT * | SELECT | INSERT | UPDATE | DELETE | Clear | Format | Get auto-saved query | <<

☐ Bind parameters

Delimiter [;] | ☐ Show this query here again | ☐ Retain query box | ☐ Rollback when finished | ☑ Enable foreign key checks | Go

Hide query box

✔ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0038 seconds.)

CREATE VIEW Department_View AS SELECT deptnum,deptname,manager_id FROM department;

[Edit inline] [Edit] [Create PHP code]

Select * from department_view where deptnum = 8413;

Browse | Structure | SQL | Search | Insert | Export | Privileges | Operations

Show query box

⚠ Current selection does not contain a unique column. Grid edit, Edit, Copy and Delete features may result in undesired behavior. ⓘ

✔ Showing rows 0 - 0 (1 total, Query took 0.0010 seconds.)

select * from department_view where deptnum = 8413;

☐ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

☐ Show all | Number of rows: [25] | Filter rows: [Search this table]

Extra options

←T→			▼ deptnum	deptname	manager_id
☐	✐ Edit	⬚ Copy	⊖ Delete	8413	Machine learning	332163712

☐ Check all | With selected: ✐ Edit | ⬚ Copy | ⊖ Delete | 📤 Export

☐ Show all | Number of rows: [25] | Filter rows: [Search this table]

Query results operations

Dropping the view:

Select * from department where deptnum = 8413;

After update: